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PROF. J. M. MAISCH.

Professor John Michael Maisch was born in Germany, at Hanau on the Main, on the 30th of January, 1831, his father being Conrad Maisch, a merchant of moderate means in that town. He attended at first a private school and later the city free school. When at the age of ten he had passed through the four classes of this institution, he was admitted into the middle public school.

Here he soon attracted the attention of his teacher to such an extent that in a short time he became a frequent visitor at Pastor Wörishoffer's home. By him he was employed to correct the lessons of the lower class and in return received instruction in the rudiments of French. At the age of twelve and a half years he left this school, and on the advice of his parents he determined to learn the jewelry business, Hanau being justly renowned for the skilful work of her artisans in this trade. His instruction here lasted, however, only a few days, as he was still of the age when he was compelled by law to attend school and his parents could not obtain an official dismissal. School Inspector Roeder, on the recommendation of his Pastor Wörishoffer, however, obtained for him free instruction in the class of the Realschule into which he was taken on trial. Here again he proved an apt scholar and drew the attention of his teacher, Pastor Beinhauer. Roeder having obtained permission to open an Oberrealschule, Maisch was taken into the third division. Theobald, the teacher of Botany and Zoölogy, became interested in the young student and revealed to him the wonders of the microscope. Under the same direction Maisch attended botanical and mineralogical excursions in the vicinity of Hanau. These oppor-

tunities awakened in the young man a decided liking for the natural sciences and in great part shaped the course of his after life.

Beinhauer was orthodox and while Roeder was an ordained preacher, his passion for the natural sciences led him more and more into different channels until he taught only these branches. Having the companionship of two such men, the idea of the union of religion and science had something fascinating for Maisch, which was further encouraged by the promise of his teachers to prepare him for the University and the wish of his mother to see her son a pulpit orator.

The school which Maisch was attending did not have in its curriculum the necessary branches to permit his matriculation at a university and this forced him to obtain outside private lessons, especially in the dead languages. Of much greater importance was the beginning of the instruction in chemistry under Dr. Bromeis, for he took great interest in chemical experiments and was known among his companions as a very earnest student. Bromeis encouraged his students to begin original researches and he permitted Maisch to assist him in the continuation of his work on the fatty acids and resins. These opportunities caused Maisch to give up his intention of studying theology and devote himself entirely to the natural sciences as a life-work, but it seemed as if fate had ordained otherwise.

It was the intention of his teachers to prepare him so that he would be admitted into one of the upper classes of the Gymnasium; this demanded from him extraordinary exertion, which was too much for his weakened constitution, and at the close of the school year, we find him confined to his bed by sickness. On his recovery, and after a conference with his physician, his teachers advised him to relinquish the idea of studying at a university, as they considered it beyond his powers of endurance. With a sad heart he followed their advice, and intended to take up the study of pharmacy, but here similar obstacles were encountered, the improbability of his obtaining the concession of an apothecary being the principal one. He then entered the service of Hesse, and about this time he joined the Turners of Hanau, and with them made the excursions which have become memorable in the history of the valley of the Main. These excursions were not taken so much to extend the use, or show the value of gymnastics, as to spread the sentiments of revolution,

so prevalent at that time. Maisch assisted in this with all his powers, and in consequence he left the service of the State, as he thought it was inconsistent to be in its service in the daytime, and working against it at night. In 1849, he accompanied the Turners on an excursion to Baden, and was captured at Sinsheim, but with the assistance of some comrades he escaped from prison and returned home, and ultimately emigrated to America, landing in Baltimore. On his arrival he was almost penniless, and to supply the necessaries of life he obtained employment in a paper-box manufactory, and subsequently in a mattress factory until about half a year later he made the acquaintance of Dr. Wiss; this gentleman desired to open a drug store, which he afterwards succeeded in doing, and Mr. Maisch took charge of the store for him during a few months in 1850, after being instructed by Dr. Wiss and Dr. Vogler, and gaining more knowledge from books placed at his disposal by Dr. Wiss. Towards the end of 1851, the drug store was sold to other parties, and Maisch then obtained employment in Washington, where he held the position of assistant in a drug store until 1853, when he went to Philadelphia, as his parents and some of his sisters had arrived there from Europe. Until 1855, he acted as clerk in Philadelphia and New York and in the latter part of this year was employed in a chemical factory of Brooklyn. In 1856, Mr. Maisch returned to Philadelphia and accepted the position of clerk, with E. B. Garrigues and Robert Shoemaker & Co., until 1859, he then took charge of one of the departments of instruction in the School of Pharmacy for medical students, which was conducted by Prof. Parrish, in an upper room in the building at the southwest corner of Eighth and Arch Streets, the first story of which was occupied as his drug store. In 1861, Mr. Maisch was called to the College of Pharmacy of the City of New York, as Professor of Pharmacy and Materia Medica, and for the time in which he was not engaged in his duties at the College, he found employment at the laboratory of Dr. E. R. Squibb. In 1863, Prof. Maisch returned to Philadelphia to organize and conduct the U. S. Army Laboratory, proposed by Surgeon-General Hammond, and of this he was Director until the close of the war. In these two and a half years of the existence of the Laboratory there was a saving of more than $750,000 to the Government. After the close of the war, Prof. Maisch opened a drug store at 1607 Ridge Avenue, which he conducted

until 1871, when he was compelled to dispose of it, in order to give his whole attention to his duties at the Philadelphia College of Pharmacy and the Secretaryship of the American Pharmaceutical Association. In 1856, Mr. Maisch joined the American Pharmaceutical Association, and in 1860 was made Reporter on the Progress of Pharmacy. Here he introduced the arrangement of the articles which has since been retained. In 1863, he was made First Vice-President; in 1865, was elected Permanent Secretary, which position he retained until the time of his death. When, in 1867, the American Pharmaceutical Association offered its assistance to the legislatures of the several States, with a view of formulating pharmacy laws, Prof. Maisch collected by correspondence with the Governors of the several states the laws and regulations then in force, and he retained his interest in this subject as long as he lived. Until the time of his return to Philadelphia, in 1856, on account of the pressure of other duties, Mr. Maisch had no chance to use a microscope, but towards the end of 1860 he induced the College of Pharmacy to obtain a good one, he himself collecting from the members a part of the purchase-money. The microscope arrived in the beginning of 1861, and was used by Prof. Maisch in his work until he came in possession of one himself. His early love for Microscopy was shown by these successful efforts in inducing the College to procure a fine instrument. With this he made a number of investigations and ultimately was able to procure an instrument of his own.

The College of Pharmacy attracted the attention of Mr. Maisch as soon as he arrived in Philadelphia, and it was not long before he was elected a member and became a contributor to its Journal. The earnest manner and industrious habits of the young German made an indelible impression upon the Editor of the Journal and the Professor of Pharmacy in the College, Wm. Procter, Jr. To such an extent had the subject of this sketch impressed his favorable qualities upon the members of the College and all who had come to know him, that it was not surprising to find that upon the relinquishment of the chair of Pharmacy, in 1866, by Prof. Procter, on account of ill health, that John M. Maisch was called upon to fill the vacancy. In 1867, however, Prof. Maisch exchanged chairs with Prof. Parrish and at the same time the title of the chair of Materia Medica, formerly held by Prof. Parrish, was enlarged so that it became that of "Materia Medica and Botany." This was a

wise step for the College to take, as each Professor subsequently greatly enlarged his sphere of action and each found a more congenial field for his respective talents. Prof. Maisch retained the chair of Materia Medica and Botany until the time of his death, a period of twenty-six years, and the services which he has rendered to American Pharmacy during this time can never be forgotten.

More than two thousand students have profited by his thorough and painstaking instruction, and can attest to the profundity of his knowledge and the unwearied industry which he ever manifested in the discharge of his official duties.

His connection with this Journal began at an early date and was continued as long as he lived, first, when only twenty-three years old as a writer of papers, and twelve years afterwards he succeeded the talented Procter as editor. When ill health compelled Prof. Procter, in 1870, to resign the editorship of the American Journal of Pharmacy, Prof. Maisch was unanimously chosen to fill the position and at the same time the Journal was enlarged by making it a monthly instead of a bi-monthly publication, and the same qualities with which he was so plentifully endowed were now enlisted in this new field of labor. The year 1870 was an eventful one for him, for in addition to his other duties, he was called to take charge of the chemical laboratory, which had been organized in the College, through the efforts of the Alumni Association.

His interest in Pharmaceutical literature, and his desire to add to the sum of knowledge in his chosen profession, was manifested soon after he arrived in Philadelphia, and the first paper which he wrote for the American Journal of Pharmacy, appeared in March, 1854, the title being "On the Adulteration of Drugs and Chemical Preparations." This was a subject which was always an attractive one to his mind at all periods of his professional career, many of his papers in the later years of his life being devoted to the detection of adulterations, sophistications and accidental contaminations found in drugs. This was a natural consequence of his settling down to the conviction that his life-work would be more in Pharmacology than Pharmacy, and his election to the chair of Materia Medica, in 1867, and subsequently the issue of the National Dispensatory, and particularly the appearance of his work on "Organic Materia Medica," showed the main trend of his researches, the former work had Dr. Alfred Stille, as medical author, he furnishing the therapeu-

tical contributions, whilst Prof. Maisch supplied the botanical, chemical and pharmaceutical material; this work has gone through four editions. He doubtless felt the necessity, as his duties multiplied, of giving the most attention to Pharmacognosy, and it has been fortunate for American Pharmacy that he recognized the direction in which he could use his talents to the best advantage. That he was fond of chemical investigation, no one can doubt; the many chemical papers which have been published in the Journal will attest to this truth; his devotion to the interests of Pharmacy is shown by the fact that nearly all of his contributions have a bearing upon subjects more or less directly connected with the alleviation of human suffering.

The second paper, which he wrote in 1854, was on "Liquor Ferri Iodidi." His subsequent contributions were as follows: In 1855, three chemical papers and two translations; in 1856, three papers on "The Relations of Physicians and Pharmacists," and five on pharmaceutical subjects. Of six papers appearing in 1857, four were on pharmacy and two were chemical; in 1858, four pharmaceutical and one chemical paper; in 1859, six pharmaceutical and one on a new system of German weights; in 1860, three chemical and five pharmaceutical; there also appeared in this year a very useful feature, "Abstracts from Foreign Journals," which Professor Maisch termed "Gleanings." His "Announcement of the School of Practical Chemistry and Pharmacy," 800 Arch Street, of which he was made Director, appears in the May number of this year.

On the 24th of September, 1860, he was elected member of the Board of Trustees of the Philadelphia College of Pharmacy. His first botanical paper appeared in the Journal in 1861, and is entitled "On Chelidonium Majus." This contains also a chemical account of the constituents and properties of the plant. This was one of his active years, for there were published besides six chemical, three pharmaceutical and four papers on gleanings.

In 1862, he wrote one botanical and two chemical papers and one on gleanings; in 1863, one pharmaceutical, two chemical and one on gleanings; in 1864, two pharmaceutical, two chemical and one on gleanings; in 1865 and 1866, one chemical paper each year. In 1867, thirteen papers, seven of which were pharmaceutical; in 1868, one chemical, one botanical and three gleanings; in 1869, one pharmaceutical, one botanical and four gleanings; in 1870, his

first paper on pharmaceutical legislation appeared, and in connection with it two botanical papers, one chemical and three on gleanings; in 1871, fifteen contributions, seven of which were pharmaceutical; in 1872, twenty papers, twelve of which were on gleanings; in 1873, nineteen, twelve of which were on gleanings; in 1874, fourteen of which nine were on gleanings; in 1875, the same number, nine of which were on gleanings; in 1876, twenty contributions, eleven of which were on gleanings; in 1877, seventeen papers; in 1878, ten papers, four of which were botanical; in 1879, four papers; in 1880, two papers; in 1881, nineteen communications; in 1882, twenty-four papers, twenty of which were on gleanings; in 1883, twenty-four papers; in 1884, five papers; in 1885, twenty-five communications, of which nineteen were on materia medica subjects; in 1886, fourteen, twelve of which treated of botanical and materia medica subjects; in 1887, seven on materia medica subjects, one chemical and six on practical notes; in 1889, eight contributions; in 1890, twelve papers; in 1891, four papers, two of which were botanical; in 1892, three, two of which were botanical; in 1893, his last paper appears in the March number. It is entitled, "On the Tubers of Dioscorea Species."

In 1892, Prof. Maisch's friends noticed that at times he appeared to be suffering, and for the first time in many years he was occasionally compelled to relinquish some of his lectures. It was not, however, until April, 1893, that he experienced a difficulty in swallowing food. At first no one realized the significance of this symptom, and it was only after a considerable increase of this painful sensation that he sought medical advice. Gradually, but surely, the orifice of the œsophagus became smaller and smaller, and it was soon recognized that a malignant growth was pressing upon it to such an extent that solid food could no longer find an entrance into the stomach, and after five months of painful suffering, which he bore with fortitude and resignation, he peacefully passed away on the 10th of September, 1893. During the five months immediately preceding his death, he continued to perform every duty that he possibly could, whilst his faithful wife and children assisted him greatly by their devoted service. During the summer the approaching meeting of the American Pharmaceutical Association in Chicago, and the assembling of the International Congress at the same place were events that he had looked forward to with particular

interest. But when the month of August was reached, the progress of his disease was so great, that he was compelled to relinquish all idea of being present. The grief of his friends at these gatherings upon learning his condition was heartfelt and a most touching incident occurred when the President of the Pharmaceutical Society of Great Britain announced to the meeting that he was the bearer of the Hanbury Gold Medal which had been awarded to Prof. Maisch for distinguished services and for original research in the Natural History and Chemistry of Drugs. Fortunately, this testimonial reached him whilst he was in full possession of his faculties, although suffering severely. His face, wasted by the long-continued pain to which he had been subjected, lit up with a smile of pleasure when he received it, but a few short days before his earthly existence closed. A review of his eventful life teaches the invaluable lesson of persistent application in the face of what were apparently insuperable obstacles. His mind was imbued with a love for science, and the characteristic which thoroughly pervaded all of Prof. Maisch's work as a scientist, was the persistent search for truth, for he would never rest until he was satisfied that the utmost effort had been put forth to eliminate error, and it was the knowledge of this trait in his character which gave to his scientific opinions so much weight. Outspoken often to brusqueness in condemning error, his mind was always open to conviction, and he was never ashamed to change his views when convinced that they were not correct. Prof. Maisch had a profound love for the country of his adoption, and although he had lived in America forty-three years, no one could ever mistake his nationality; his strong, rugged features and the slight accent, which was never quite absent from his speech, at once proclaimed his German birth. Having decided to make America his home, he applied himself with all his powers towards developing the science which he had chosen for his life-work. It was no grudging service which he gave. Although loving his native country devotedly, he did not belong to the class who can find nothing in the country of their adoption to commend, but with rare wisdom and without sacrificing truth he believed he could accomplish more good and serve the best interests of all more devotedly by endeavoring to guide those who looked up to him as a leader in correct paths without denouncing them for their inability to realize his ideal. These convictions coupled with his stanch integrity, high sense of

honor and powerful intellect, had much to do with his success in strengthening his influence with his American brethren, and the heartfelt expressions of grief and regret which have been heard in every State of the Union attest the universal regard and esteem with which he was held. Truly, American Pharmacy has lost a master mind by the death of John Michael Maisch. J. P. R.

NOTE ON RESIN OF PODOPHYLLUM, U. S. P.

GEORGE M. BERINGER, PH.G.

The object of the present note is not to add anything to the history or chemistry of this valuable remedy, but simply to correct the errors in the statement of its action to solvents that have been incorporated in the Pharmacopœia of 1890.

The errors appear to have originated in the National Dispensatory, which states in regard to resin of podophyllum: "It dissolves to a limited extent in carbon bisulphide. From 15 to 20 per cent. of the resin is soluble in ether and 80 per cent. is dissolved by boiling water and reprecipitated on cooling. A small portion of the resin, however, remains in solution in the water."

In 1889, I had occasion to examine two samples of commercial "*podophyllin.*" The one was of a bright yellowish green color and yielded to ether 66 per cent. This evidently was not made in accordance with the pharmacopœial formula as it bore evidence of having been precipitated by solution of alum. The other sample appeared to conform with that made by the official process and yielded to ether 81 per cent. At the time, the attention of Professor Maisch was called to the evident misstatement in his book. He frankly stated that evidently it was a mistake and that the word *soluble* in relation to the action of ether should be *insoluble* and, it is in the knowledge of the writer, that in the edition now in press he had made the correction.

We are surprised to find this error reiterated in the new Pharmacopœia, where on p. 338 occurs the following unequivocal statement: "Ether dissolves 15 to 20 per cent. of it; boiling water dissolves about 80 per cent., and deposits most of it again on cooling." The object of this note is to prove that both of these statements are erroneous.

Upon referring to the literature of this subject we are confused by

the varying results reported by different investigators. After making due allowance for the fact that these writers working with rhizome collected at different times and seasons of growth would obtain products showing necessarily variation in the percentage and composition of the resin, there are still a number of statements that cannot be made to coincide with our present knowledge. While we are inclined to believe, notably from the experiments reported by Tilden (Proceedings American Pharmaceutical Association, 1859, p. 334), that the correct time for collection of podophyllum is in the autumn, as the percentage of resin and of ether soluble resin appears then to be the larger, the Pharmacopœia does not mention the proper time for collection. It is a matter of regret that, up to the present time, no systematic experiments have been carried out to decide the variation in the composition of the rhizome as collected at different seasons.

It was deemed advisable to prepare a fresh sample of resin of podophyllum to test these statements of the Pharmacopœia and 1,000 gm. of podophyllum was treated strictly in accordance with the official directions. It yielded 39 gm. of resin having a greenish-brown color, with a slight tinge of yellow. This yield, 3·9 per cent., is somewhat less than that reported by some writers, but is believed to be in harmony with the results reported by the most reliable investigators.

It exhibited the following solubilities: Ether (U. S. P., 1890), extracted 82 per cent. Chloroform extracted 70 per cent. Alcohol, methyl alcohol and amyl alcohol readily dissolve it. Solutions of the caustic alkalies dissolve it with but a slight residue. Acetic acid, U. S. P., dissolves it but partly, but the glacial acetic acid readily dissolves it entirely. Carbon disulphide partly dissolves it. Benzin and benzol each dissolve but a minute trace, about one-half of one per cent., mostly yellow coloring matter. It is insoluble in turpentine. Boiling water takes up about 22 per cent., and deposits most of this again on cooling.

Concerning the solubility of resin of podophyllum in ether, investigators report as follows: John W. Cadbu[illegible] (Amer. Journ. of Pharm., 1858, p. 301), 77 per cent.; this resin being precipitated by non-acidulated water. Harvey Allen (Amer. Journ. of Pharm., 1859, p. 206), of resin of his own preparation, 80 per cent. was soluble in ether, of a purchased sample 75 per cent. Tilden (Proceedings

Amer. Pharm. Assoc., 1859, p. 334), the resin prepared from rhizome collected in the spring, 52 per cent. was soluble in ether and of that prepared from autumn collection 96 per cent. Wm. G. Parrish (Amer. Journ. of Pharm., 1860, p. 208) reported 85 per cent. C. Bullock (Amer. Journ. of Pharm., 1862, p. 144) states that sample of resin prepared by Merrill & Co., 63 per cent. was soluble in ether. F. B. Power (Amer. Journ. of Pharm., 1874, p. 227) reports for his own make 92 per cent. soluble in ether, purchased samples 59 to 86 per cent. The same author, in a later paper (Proceedings Amer. Pharm. Assoc., 1877, p. 432), writes, " Of the purified officinal resin, 82 per cent. was found to be soluble in ether of spec. grav. 0·720, at 22° C." My own sample exhibits 82 per cent. While the figures above quoted show considerable variation, they prove, without doubt, that properly prepared resin of podophyllum yields to ether about 80 per cent., and not 15 or 20 per cent., as stated by the Pharmacopœia.

Regarding its solubility in water, Professor J. M. Maisch writes, (Amer. Journ. of Pharmacy, 1874, p. 231), " A comparatively small amount of the officinal resin appeared to be insoluble in hot water, but its percentage was not ascertained." This statement is not in accordance with my observations. Cadbury (loc. cit.) states, " Water alone, either hot or cold, did not dissolve any, nor do the dilute acids, nor oil of turpentine hold it in solution." Dr. H. Pursell, in a paper before the Pennsylvania Pharmaceutical Association, in 1881 (Amer. Journ. of Pharm., 1881, p. 377), says, " On heating the resin with 3 parts of water at 150° F. 4 per cent. of extract, soluble in water, was obtained."

On the other hand, F. B. Power (Proceed. Amer. Pharm. Assoc., 1877, p. 431) aims to confirm the statement of Maisch, and writes as follows: " To ascertain the extent of the solubility of the resin in boiling water, one gram of the resin was placed in a flask with distilled water upon the water-bath: the resin soon softens to a brownish mass, while the water assumes a bright amber color, perfectly transparent while hot, but becoming turbid upon cooling and gradually depositing portions of flocculent yellowish resin; the water was thus successively decanted and renewed with fresh portions, the operation being continued for many days, until the water became no longer appreciably colored. The writer succeeded in dissolving 80 per cent. of the purified resin by this treatment, the undissolved por-

tion being, when dry, of a very dark brown color, and is but partially soluble in ether, sp. gr. 0 720, which proves the correctness of Professor Maisch's supposition, and that the active portion of the officinal resin is almost entirely soluble in hot water."

The above citations evidently constitute the authority for the official statement regarding the solubility of this resin in water, but it certainly cannot be seriously contended that the method adopted, heating in a flask with successive portions of water for days, would yield accurate determinations of the solubility of a product of varying composition and subject to change.

In my experiments one gramme of resin was treated with 100 cc. of boiling water for ten minutes, the water then decanted from the fused resin and evaporated. The residue weighed ·227 gm. A second determination yielded ·230 gm. These results are so close as to be comparable and prove their substantial accuracy, and it is believed they represent the true solubility of resin of podophyllum in water.

Another discrepancy appears in the solvent action of chloroform, as stated by Mr. F. B. Power (American Journal of Pharmacy, 1874, 231), where 5 gm. of resin is stated to yield to chloroform only 0·02 gm. This is most likely an error, as immediately beneath on the same page the writer states that 2 gm. of the ether soluble resin yielded to chloroform 1·4. This would amount to nearly 65 per cent. of the resin coinciding fairly well with my results, 70 per cent. The solubility in chloroform of the medicinally active constituents of the resin has likewise been taken advantage of in the process of assay generally proposed.

THE UNITED STATES PHARMACOPŒIA OF 1890.

By George M. Beringer, A.M., Ph.G.

[*Continued from vol. xxiii, p. 602.*]

Volatile Oil of Betula is introduced to distinguish between the true oil of wintergreen and what is generally sold as such. The statement unnecessarily introduced in the official definition that "it is identical with methyl salicylate" is seriously disputed. We are aware that the manufacturers of methyl salicylate make this claim which has been questioned by disinterested chemists who proposed a distinguishing test. It is to be hoped that some unprejudiced chem-

ist will reinvestigate the subject thoroughly so as to settle the mooted question.

Oil of Ceylon Cinnamon is no longer official. The Pharmacopœia now describes Oil of Cinnamon as "a volatile oil from Cassia cinnamon" which implies that it is distilled from the bark. According to Messrs. Schimmel & Co. the bark yields but 1·5 per cent. of oil, having a sp. gr. 1·035, this as well as price precludes its use for this purpose. From their investigations they state, "It can, therefore, be assumed with safety, that the cassia oil of commerce is distilled in China out of the leaves, leafstalks and young twigs of the cassia plant, probably together with various refuse products worthless for other purpose."—(Semi-Annual Report Schimmel & Co., Oct., 1892, p. 14.)

Hirschsohn's alcoholic lead acetate test is adopted for detecting colophony. The character of the residue left on evaporation is a simple test that should have been given, as it yields valuable information as to the character of adulterants. The quantitative estimation of cinnamic aldehyde is likewise one of the surest tests of quality and is not very difficult to apply.

Oil of Copaiba is stated to be soluble in about 10 times its volume of alcohol and not an equal weight, as erroneously stated in 1880. My own notes show that freshly distilled oil is soluble in from 6 to 8 volumes of alcohol, but solubility varies with age, as oils a year or so old require from 10 to 15 volumes.

Oil of Pennyroyal, it should be remembered, is only the American oil distilled from hedeoma. The closely allied Austrian and Spanish oils obtained from Mentha pulegium, L., are frequently seen in commerce.

The sp. gr. of Oil of Peppermint is stated at ·900 to ·920. Pure oil generally averages ·910 and the range ·908 to ·917 has been found as fixing the limits. The statement that "the oil does not fulminate with iodine," would be correct if changed to "*should not* fulminate with iodine," as old oil or one exposed to oxidation will fume with iodine more or less.

The nitric acid test, proposed by A. B. Stevens, is adopted to detect the adulteration of this and other oils with oil of camphor. A test that will readily detect oil of copaiba in this and other oils is needed.

The sp. gr. of Oil of Sandal Wood is stated at 0·970 to 0·978. This

is too limited. Peter MacEwen reports for an Indian oil 0·989 and recommended that the official British Pharmacopœia figures be changed to 0·970 to 0·990. Mr. Holmes had previously reported for museum specimens 0·9901 (Amer. Journal of Pharmacy, 1886, p. 254.) Dodge and Olcott report (Druggists' Circular, 1889, p. 84): "We find the bulked result of a distillation to be 0·970 at 60° F. The first of the run is of a light color and weighs 0·960 at 60° F., and on account of its flowery odor is especially adapted for perfumery use. The last of the run is dark and weighs ·980 at 60°." I have examined American distilled oil, showing a gravity of 0·9809. The East Indian oil distilled in crude apparatus would of course show a higher gravity and the figures proposed by MacEwen would include this native oil.

The official test solubility in mixture of alcohol and water (3–1) is not always reliable for detecting the common adulterant, oil of cedar. E. M. Holmes (loc. cit., p. 262) concludes that the admixture of cedar oil with sandal oil to the extent of 10 per cent. is not easily detected by the reduced solubility in alcohol. My own experiments in this direction were likewise unsatisfactory. I have found the ammonio-copper solution test, proposed by M. Durand (see Braunt, "Fats and Oils," pp. 540–541), to give satisfactory results in detecting easily 3 to 5 per cent. of cedar oil. This test appears to have been overlooked by all the recent investigators, although claimed by the author to detect $\frac{1}{10}$ of one per cent. of the adulterant. Almost all of the so-called West Indian sandal wood oil in the American market is not the oil described by Holmes as obtained from an undetermined species of Rutaceæ, but is really a mixture of East Indian sandal wood oil and oils of cedar and copaiba.

In the preparation of Phosphorated Oil, I would suggest the use of chloroform in place of ether as being a much better solvent of phosphorus.

Oil of Turpentine should be accompanied by specific tests for benzin.

While the morphine strength of Opium remains at not less than 9 per cent., that of powdered opium is rightly limited to not less than 13 nor more than 15 per cent. The Pharmacopœia, 1880, admitted powdered opium of from 12 to 16 per cent. morphine, which permitted too great a variation in the strength of the pharma-

ceutical preparations. Neither the percentage of water allowable in opium nor the yield of extract is given.

The introduction of Pepsin is accompanied by an official description sufficiently elastic to admit all the varieties of pepsin in the market, providing that they possess the required digestive value. There is a lack of definiteness in a product that may be either "white, yellowish-white, pale yellow, or yellowish;" may be either "an amorphous powder, grains or scales;" may be either "soluble or only partly soluble," and may be "opaque or translucent." Would it not have been more in accordance with pharmacopœial exactness to have introduced two pepsins, one in powder, the so-called insoluble, and the other in grains or scales, the so-called soluble? The properties of each could have been definitely fixed and the former directed for preparing the saccharated pepsin and dispensing in powders, the latter for solutions. The statement in the assay process that "100 cc. of the liquid will contain 0·2 cc. of absolute hydrochloric acid and 0·00335 gm. of the pepsin to be tested and 98 cc. of water" is a self-apparent error, as necessarily there must be somewhat more than 98 cc. of water.

The use of the various purified liquid petroleum products so largely introduced as proprietary articles has necessitated the official recognition of a Liquid Petrolatum. There is too much variation allowable in the official description of color and gravity of this product. The requirements of the Pharmacopœia Germanica for paraffinum liquidum ("without color, clear, non-fluorescent, * * * about ·880 sp. gr.") should have been adopted. The statement that it is "readily soluble in fixed oils" must be questioned as it is nearly insoluble in castor oil.

The two terms Soft Petrolatum and Hard Petrolatum replace the Petrolatum of 1880. This change, I presume, has been made to define the products suitable for different climates and uses. Fluorescence in these products is due to impurities remaining and is an indication of the degree of purification the product has been subjected to. I would suggest that in the official description "more or less fluorescent" should be changed to "nearly or quite free from fluorescence." The melting point is given for the soft at 40° to 45° C. and for the hard 45° to 51°, so that there is an intermediate melting point, 45°, where the petrolatum may be either hard or soft. The melting point for the hard petrolatum should be 48° to 52° C.

(118·4° F. to 125·6° F.) The official description of Jaborandi intended to cover both Rio Janeiro and Pernambuco Jaborandi does not agree with E. M. Holmes' description of the latter variety. The official description reads "*4 to 6 cm. broad, oval* or ovate oblong; Holmes (loc. cit.) writes *2½ to 5 cm. broad, narrowly elliptical.* The description should also describe the prominent veinlets on the upper surface.

Two pills, namely, Pilulæ Galbani Compositæ and Pilulæ Ferri Compositæ have been dismissed, and two, namely, Pilulæ Catharticæ Vegetabilis and Pilulæ Ferri Carbonatis (Blaud's pills) have been added to the official list.

Castor oil is directed as the excipient for Compound Pills of Antimony. In Compound Cathartic Pills, extract of jalap is again directed, but it is to be noted that the proportion of the ingredients has been changed so that now the official pills weigh each ·185 gm. In 1880, the weight was ·230 gm., and in 1870 ·231 gm.

In the formula for Pills of Ferrous Carbonate, the quantity of potassium carbonate directed is insufficient to decompose the quantity of ferrous sulphate directed even if an anhydrous pure carbonate of potassium is used. These pills should have been directed to be coated with an ethereal solution of tolu, as a protection against oxidation, and then the requirement that they should be freshly prepared when wanted could have been omitted.

In the formula for Pills of Phosphorus the althea and acacia have been increased so that each pill, when finished, will weigh ·120 gm. (nearly 2 grains), unnecessarily large for a pill containing only ·0006 gm., $\frac{1}{100}$ grain phosphorus. The manufacturers will hardly dare to adopt this formula.

Lead Nitrate is so little used that it might have been dropped.

Potassium Carbonate is now directed to be anhydrous, and to contain not less than 95 per cent. of the pure salt. This excludes the commercial purified carbonate or salt of tartar, which generally contains 18 per cent. of water, about 3 molecules. Prune should be the *dried* fruit of Prunus domestica, L.

In Pulvis Glycyrrhizæ Compositum, the substitution of oil of fennel for the pulverized fruit is to be noted. We see no reason for changing this formula from that original in the German Pharmacopœia.

In the description of Pyrethrum it should have been noted that

the crown of the root usually contains tufts of hair from the base of the pubescent stem.

The solubility of Resin of Podophyllum is erroneously stated on p. 338.[1] On p. 340, Pale Rose is stated to be an ingredient in Syrupus Sarsaparillæ Compositus, but it is not mentioned in the formula given for this preparation; as it has no other use it might have been omitted.

Sugar of Milk should be accompanied by tests for such adulterants as starch and glucose, and should be required to be free from fat and casein. The tests should likewise state the percentage of ash allowable, and supply other tests for inorganic salts apt to be present from the water used in its preparation.

In order to insure uniformity of product, the formula for Sapo Mollis should require a definite yield of product.

Scutellaria is stated to be 50 cm. long; most of that in the market will be 20 to 25 cm. and broken. We are again told on p. 349 that argel leaves "are frequently present" in Alexandria Senna, and a description is attached to detect this adulterant. For ten years past the writer has been examining commercial senna for this adulterant, but has not yet been successful in finding it.

Tests are wanted for detecting chloride and bromide in Sodium Iodide. Sodium Nitrate is not sufficiently used to be retained.

Sodium Nitrite is a new addition, introduced as the source of nitrogen dioxide in the new official process for spirit of nitrous ether. It is required to contain not less than 97·6 per cent. of the pure salt a degree of purity hard to obtain in the commercial salt. The price at which the chemically pure salt is now sold, $2.50 to $3 per kilo, precludes its use for this purpose. The commercial article prepared for the use of the dyer while not attaining the official purity will probably be found to answer. It is likely, however, to be contaminated with both lead and arsenic.

To the official Spirits there are four additions, Spirit of Bitter Almond, Compound Spirit of Orange, Spirit of Glonoin and Spirit of Phosphorus, and one dismissal, Perfumed Spirit or Cologne Water of 1880. Spirit of Nitrous Ether is required to yield when assayed by the nitrometer method 4 per cent. of pure ethyl nitrite. The process for the manufacture of this spirit is again changed;

[1] Experiments by the writer to decide this point are not completed, but will be reported later.

sodium nitrite, alcohol and sulphuric acid being distilled to yield the ether; which after washing and dehydrating is dissolved in 22 times its weight of alcohol. In the formula 770 gm. sodium nitrite is directed to be dissolved in 1,000 cc. water, heat not being directed. This salt is stated to require 1·5 parts of water for solution and this would necessitate increasing the amount of water directed.

The ammoniacal strength of Aromatic Spirit of Ammonia is reduced and oil of nutmeg is again directed replacing the oil of pimenta of 1880. The solution of the ammonium carbonate in the ammonia water and water should be directed to remain in the closed flask for 24 hours to insure the conversion of the acid carbonate into the normal carbonate and leaving less free alkali to react on the essential oils and darken the solution.

In Spirit of Orange the synonym, "essence of orange" should be given; oil of *sweet* orange peel should be specified and 50 gm. orange peel grated from the fresh ripe fruit should be added. In Compound Spirit of Orange, oil of *bitter* orange peel should be specified. In Spirit of Camphor, water is omitted, alcohol alone being the solvent. At least 10 per cent. of water should have been directed. The addition of a small amount of water seems to bring out the pungency of the camphor. Spirits of Gaultheria, Juniper, Juniper Compound, Lavender and Nutmeg have all been increased in strength.

Strophanthus is stated to be nearly inodorous, this is hardly accurate as a very disagreeable odor is obtained on crushing the seed.

Strychnine Sulphate is stated to contain 5 molecules of water, whereas in 1880 it was recognized as containing 7 molecules. As this would materially affect the strength of such a potent remedy as well as its physical properties, solubility, etc., it is interesting to know which formula corresponds with the present commercial article.

The Pharmacopœia is careful to specify both the shape and weight of the various suppositories. The rectal suppository is directed to be 1 gm. as in 1880. In many cases this has proven too small except for infants. The 2 gm. size is preferable. The vaginal suppository is directed to be *globular*, and about 3 gm. in weight. Six gm. is preferable, especially where large quantities of such articles as boric acid and iodoform are directed as has become customary.

I see no reason why the official directions should not order that the medicinal ingredients be incorporated with all the cacao butter, it being grated and added in portions, and the resulting mass melted on a water-bath, and poured into moulds as melted.

It is to be observed that in Suppositories of Glycerin the formula directs 68 gm. "to make ten rectal suppositories." There will be some loss of water, of course, in the preparation. A trial of this formula yielded 65 gm.; but this would yield suppositories of 6·5 gm. each, if made into *ten suppositories*, as directed. On the other hand, one gramme rectal suppositories of glycerin are too small except for infants. These, as generally supplied, are from 2 gm. to 2·5 gm. each. The direction that they should be freshly prepared when required is unnecessary and impractical. The permanence of glycerin suppositories is a practical test of their quality.

The process of cold percolation is for the first time officially applied to the preparation of syrups.

The exact instructions for carrying out this process, given under Syrupus, on p. 387, should be sufficient for all intelligent pharmacists, and there should be no necessity for a repetition of the instruction in each of the other ten syrups in which this process is officially permitted. The statement that the solution of the sugar may also be effected by the process of percolation as described on p. 387 would be sufficient.

The formula of 1880 for Syrup of Acacia is maintained, with the exception that the mucilage of acacia is directed to be recently prepared. The mucilage itself is very prone to decomposition. It is regretted that the formula of the 1870 Pharmacopœia, which yielded an excellent preparation, that properly kept remained unaltered for some time, was not again introduced.

In Syrup of Citric Acid the amount of spirit of lemon is greatly increased, making the preparation correspond more nearly to the lemon syrup, dismissed.

The formula for Syrup of Hydriodic Acid of the Pharmacopœia of 1880 is discarded, and the process of the National Formulary is introduced. In the official formula the quantity of tartaric acid directed, 12 gm., is insufficient to decompose both the potassium iodide and potassium hypophosphite directed and necessarily a portion must remain undecomposed in the product. To ensure entire decomposition 13·19 gm. would be required. The tartaric acid

should be directed to be *crystals* as the experience of the writer is that the *commercial* powdered acid when used in this preparation causes liberation of iodine. The use of hypophosphite of potassium as a preservative is unnecessary, provided a small amount of sugar is added to the acid solution before filtering. The official directions to evaporate the solution on a water-bath, and when cold to mix with syrup is likely to result in decomposition of the hydriodic acid; why not direct the acid solution to be filtered into sugar and a sufficient quantity of distilled water added and the sugar dissolved by agitation? In the report of the Pharmacopœia Committee of the Philadelphia College of Pharmacy, submitted to the National Convention, will be found a formula containing these suggestions. To test this formula samples have been preserved for over a year, and in one instance for over three years, with satisfactory results. The addition of a small amount of spirit of orange would improve this syrup and give it distinguishing character.

The addition of both alcohol and glycerin in the formula for Syrup of Althæa is endorsed and will render this a more stable preparation than it has been in the past.

The directions for preparing Syrup of Almond is sadly erroneous, and we can only conjecture what the intention was. In the formula, 200 cc. of water is directed and quantity sufficient of syrup to make 1,000 cc.; but in the instructions 330 cc. of water is used, and then in addition *water* to make the product measure 1,000 cc. For the latter, syrup evidently was intended.

In Syrup of Orange, the orange peel cut into shreds is boiled with alcohol for 5 minutes and after cooling the tincture expressed. Macerating the orange peel, *grated* from the fruit, with the alcohol for 2 or 3 days without heat, and then expressing and washing the residue with sufficient alcohol would be preferable.

In Syrup of Calcium Lactophosphate the salt is directed to be prepared by dissolving the calcium carbonate in lactic acid and adding phosphoric acid. There is a decided excess of acid directed. Stronger orange flower water should be directed and was most likely intended as the quantity directed to be used is much less than that ordered in 1880.

The saccharine strength of Syrup of Ferrous Iodide is now less than 50 per cent. instead of 60 per cent. in 1880, and syrup is used instead of sugar, the boiling ferrous iodide solution is filtered into

the syrup which is not directed to be warmed previously, otherwise the process is identical with that of the Pharmacopœia of 1870.

Syrup of Hypophosphites now contains a small amount of hypophosphorous acid in place of the citric acid of the 1880 edition. The quantity of sugar directed should be increased to 600 gm. In Syrup of Hypophosphites with Iron, ferrous lactate is retained, but is directed to be dissolved by aid of potassium citrate; ferric hypophosphite should have been directed, making all the metallic salts used hypophosphites.

The addition of acetic acid and glycerin to Syrup of Ipecac is a decided improvement.

It is a question if in the new official formula for Syrup of Lactucarium the valuable portion is not precipitated by the water, and allowed to remain with the calcium phosphate on the filter? With the present official tincture of lactucarium a syrup, yielding but a small amount of precipitate on standing, can be made by the following formula: tincture of lactucarium 100 cc., glycerin 100 cc., syrup 800 cc., mix the tincture with the glycerin and add the syrup to the mixture.

In Syrup of Wild Cherry the glycerin is greatly increased, and is now part of the menstruum and not added to the percolate. We cannot approve this formula, as the resulting syrup is more remarkable for astringency than flavor.

Syrup of Rhubarb is a decided improvement over the formula of 1870, and yields a more stable preparation.

In Compound Syrup of Sarsaparilla the suggestion of Oldberg to omit both the guaiac wood and pale rose has been adopted, and oils of sassafras and gaultheria have again taken the place of their respective drugs directed in the Pharmacopœia of 1880 The use of fluid extracts of sarsaparilla, glycyrrhiza and senna in the preparation of this syrup is another innovation.

For preparing Syrup of Senna, Alexandria senna only is rightly directed to be used. In the direction for this preparation we are instructed to prepare 600 cc. of infusion. "Strain this, and, when it is cold, mix it with the alcohol (150 cc.) in which the oil of coriander (5 cc.) has previously been dissolved. Set it aside until the precipitate has subsided, then pour off the clear liquid, filter the remainder, and pass enough water through the filter to obtain 550 cc." It is to be noted that *755 cc.* of liquid is to be filtered, and the fil-

trate to be *made up to 550 cc.* by washing the precipitate. The precipitate cannot occupy the space of 255 cc. of the liquid. The 600 cc. of infusion should be directed to be evaporated to 400 cc., and then the alcohol and oil of coriander added and the process continued as in the official direction.

The tinctures as a class show a decided improvement. With but one exception, and that, most likely unintentional, the formulas are given for the uniform quantity of 1 liter of product. In Tincture of Aconite the suggestion of Tscheppe to reduce the alcoholic strength of the menstruum has been accepted and 7 vols. alcohol, 3 vols. water now are directed in place of alcohol of the previous edition.

In Tincture of Aloes, liquorice root is now directed in place of the extract and percolation is ordered instead of maceration. Liquorice root is likewise added to the Tincture of Aloes and Myrrh, an unnecessary addition. I would prefer maceration to percolation in both of these tinctures.

In Tincture of Arnica the arnica flowers in No. 20 powder are to be packed into a cylindrical percolator, *without* previous *moistening*. We cannot see why this exception should be made to the generally adopted rule of moistening the powder before packing.

The adoption of alcohol in place of diluted alcohol for Tincture of Calendula is a change that cannot be approved. Diluted alcohol even of the strength of the Pharmacopœia of 1880 extracted this drug and yielded a permanent tincture The use to which this preparation is generally applied, namely, external application to wounds, bruises, etc., makes strong alcohol undesirable as the menstruum.

The Pharmacopœia of 1880 reduced the strength of Tincture of Indian Cannabis and it now suffers another reduction of nearly 5 per cent. in the amount of the drug used, equivalent to a reduction of nearly 25 per cent. in strength.

Tincture of Cinnamon is now to be made from the Ceylon cinnamon and contains 5 per cent. by volume of glycerin.

In Tincture of Cubebs the menstruum becomes alcohol in place of diluted alcohol and the drug strength is doubled. Both of these are good changes.

In the formula given for Tinctures of Fresh Herbs, the amount of product to be obtained is not stated. This would vary with the amount of moisture present in the various herbs. It evidently was the intention to direct that the so-called 50 per cent. tincture should

be obtained, that is 50 gm. of the fresh drug to be represented by 100 cc. of the finished tincture. In order to attain this object but 900 cc. of alcohol should be directed to be used in the maceration and then the residue after expression and the filter washed with sufficient alcohol to obtain 1,000 cc. of tincture.

The increase in alcoholic strength of the menstruum used for Tincture of Galls and the reduction in that directed for Tincture of Gelsemium are both good changes.

In the Compound Tincture of Gentian, it is to be noted that the amount of Cardamom has been reduced one-half. We doubt if too much aromatic material could be introduced in this preparation.

Tincture of Lactucarium is introduced solely for the purpose of making therefrom the syrup. As a substitute for the unsatisfactory and difficult to prepare fluid extract of 1880, it is a welcome addition.

Elsewhere, the writer has called attention to the impossibility of preparing Tincture of Musk, containing 10 per cent. of musk, as directed by the Pharmacopœia of 1880, and attempted to prove that even in a tincture containing 2 per cent. of pure musk it was not completely extracted. In the new edition, the first proposition appears to be recognized, and now the tincture is directed to be made 50 gm. in 1,000 cc., about 5 per cent. To have made it 2 per cent. would have brought it in harmony with the German Pharmacopœia and as strong as a tincture of *pure musk* can be made.

If the official directions for preparing Tincture of Nux Vomica are followed, using only extract of nux vomica corresponding to the official requirements, an active remedy must result. In future, tincture of nux vomica from all sources should be uniform.

The formula for Tincture of Opium is likewise excellent, and with the morphine strength of powdered opium, as limited by the Pharmacopœia, there remains no excuse for the want of uniformity in this preparation as supplied by different pharmacists.

Tinctures of Physostigma and Stramonium Seed have been increased nearly 50 per cent. in strength, there now being 150 gm. of the drug in 1,000 cc., instead of 10 per cent. This strength has been adopted for many of the tinctures of poisonous drugs.

Tincture of Quillaia is a new addition, being a concentrated decoction, with the addition of 35 per cent. by volume of alcohol as a preservative.

For Tincture of Rhubarb, a menstruum containing 60 per cent. of alcohol by volume and 10 per cent. of glycerin, has been adopted, and percolation completed with alcohol 60 volumes, water 30 volumes. For Aromatic Tincture of Rhubarb and for Sweet Tincture of Rhubarb the menstruum contains 50 per cent. by volume of alcohol and 10 per cent. of glycerin, and percolation is continued with diluted alcohol. The amount of glycerin is excessive, and we see no reason why the same menstruum should not have been adopted for all three, especially as the former contains less aromatic material.

The introduction of acetic acid in preparing Tincture of Sanguinaria is good. Acetic acid appears to be peculiarly adapted for extracting this drug.

The menstruum from Tincture of Squill now becomes the same as that for the fluid extract, being 3 vols. alcohol, 1 vol. water.

Tincture of Strophanthus is one of the newer remedies that has merited recognition by the Pharmacopœia. It is regretted that in the official formula no instructions are given for removing the oil from the powdered seed before percolation. This oil of an exceedingly disagreeable character, will average 30 per cent. of the weight of the seed and is easily removed by ether or purified benzin or even largely removed as directed in the German Pharmacopœia by expression. By the use of a weaker alcoholic menstruum than that originally proposed for this preparation, the Pharmacopœia evidently aims to diminish the amount of oil extracted. The alcoholic strength of the menstruum adopted, 65 per cent. of alcohol, U. S. P., by volume corresponds closely to the diluted alcohol adopted in the German Pharmacopœia (68 per cent. by vol. Ph. G.)

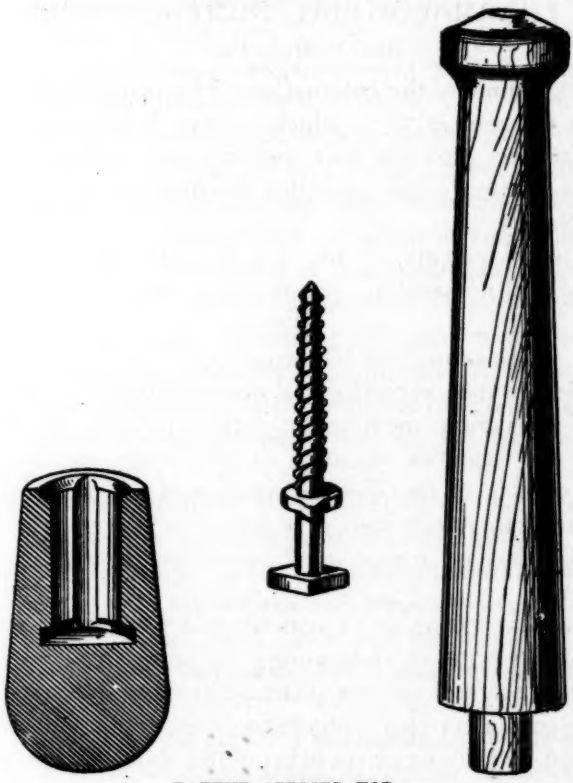
Tincture of Sumbul remains 10 per cent. sumbul, while the alcoholic strength of menstruum is reduced. This tincture is too weak to be very active. It should contain at least 25 per cent. of the drug or be entirely dismissed and a fluid extract of sumbul introduced.

AN IMPROVED PESTLE.

By I. J. White, Ph.G.

The annoyance and inconvenience druggists have had for many years in the use of the old style wax-jointed pestle has been overcome by the use of a pestle made as below described. In this the

wedgewood head has two vertical grooves, of which the cut shows one, running down on opposite sides to a countersunk groove at right angles to the other two. This groove runs around on the inside at about half the height of the head, and is just large enough to permit of the complete turning of the head of the screw. The shank is oval, and has a sliding nut, which falls into the grooves in the pestle head when the screw has been turned sufficiently. The



PATENT APPLIED FOR.

nut when in place prevents the turning of the screw. The oak handle is tapped out to receive the screw, and has a projection which fits into a circular opening in the pestle head, thereby making the joint more stable. In joining the head and the handle the sliding nut must be lifted up and placed at right angles to the screw head. The screw is then placed over the wedgewood head, so that the angles on the head of the screw come in line with the grooves

in the pestle head, it is then pushed down to the bottom, given half a turn, when the sliding nut falls into the grooves The head pulling on the horizontal groove prevents the falling out of the screw. The handle is then screwed on, which thus completes the pestle. A patent has been applied for the contrivance. The pestle will be placed on the market at or very near the cost of the old style pestle.

PHARMACOPŒIAL NOMENCLATURE.[1]

DR. E. BILTZ, ERFURT.

The programme of the International Pharmaceutical Congress, to be held in Chicago in 1893, which I have before me, divides the subjects for discussion into four sections, and submits for deliberation under Section 3 the so-called Pharmacopœial Questions. In reply to No. 23:

What improvements, if any, are desirable and practicable in pharmacopœial nomenclature? Is a near approach to uniformity possible?

I beg leave to submit the following:

The object of the pharmacopœial nomenclature is, as is well known, to give to the various medicaments titles *as correct* as the requirements of the scientific standing of pharmacy on the one hand, and the objects of the medical profession on the other, would seem to indicate; they should be *scientifically correct*, and secondly, *practicable*—that is, *easy of application*, *comprehensible*, and, above all, *concise*.

The pharmacopœias of all nations give proof of the frequency of difficulties met with in endeavoring to unite these two points of view, forcing the authors of a pharmacopœia to one-sided decisions, and the question in this connection is, above all, what success has been scored by the one or the other of the above-named objects, and also which names have received not only popular approval, but also the sanction of custom or the approval of the medical profession. The entire proposition can be expressed in a few words by the question, *What must be the object in the naming of medicaments?* and the answer, *the greatest possible immunity from danger* in the treatment of disease by the combined responsibility of the physician and the apothecary through the *proper compilation* and the *correct under-*

[1] Read at the International Pharmaceutical Congress, at Chicago.

standing of physicians' prescriptions, and, above all, through the international use of like-sounding names for the medicaments.

There can be no doubt that the proper naming of medicaments is a subject of great importance, and that, for the sake of convenience and safety (that is, the avoidance of waste of time and of errors), the name selected should be:

(1) *As short as possible*, or, in other words, easy of application.

(2) *Permanent*, or, in other words, not changing with every new theory.

(3) *As comprehensible* as possible, above all unembellished.

(4) *Well-known* and *familiar through usage*.

Of course, scientific names should have the preference, providing they conform to all the requirements; beyond that the *only* weight given to science should be that the name to be chosen expresses nothing which is scientifically false. For all attempts to give an idea of the chemical composition of the medicaments by a name which did not accord with the above four conditions have been futile, and totally ignored in practice; the name could be found in the pharmacopœias, but never on prescriptions. However, a pharmacopœia must serve actualities, and the language customary between physician and apothecary, based on materia medica, must be one of easy fluency.

The result of this argument is that in the compilation of a pharmacopœia, as regards the nomenclature, all stiffness must be avoided, and a *compromise* made, for the benefit of both the medical and the pharmaceutical professions, *which gives proper weight to both science and practice* in the right place, and which, while giving no room to the objection of being unscientific, deserves all the praise of universal practicability.

It will, perhaps, be desirable to exemplify what has been said, and thereby give some hints which might be of service in the future.

First, as an example of the eminent value of brevity and general familiarity of a name, even when that name is not adaptable as a title in the Pharmacopœia, but, nevertheless, carries with it the convincing force of brevity and familiarity, and thereby vouches also for the greatest safety; the name "sublimate," as it is used in the medical-pharmaceutical language. To whom would the thought come, at the mention of this name, that a sublimated body is meant

which, from this very use of this name is liable to be confounded with the chemically closely allied "calomel" (as this is also a sublimate), and in this form is even the true original medicinal calomel? But every one would at once remember that the word indicates the poisonous mercuric chloride, and would be so understood over the whole civilized world.

As I have said, I would of course not think of suggesting this name as a title for mercuric chloride, as scientifically it lacks diagnostic character; but I know of no other example which would show in a more convincing manner the value of brevity and the force lying in *usus tyrannus*, which cannot be over-estimated. And with this in view I recommend the adoption of such names as the following:

Alumen for *Potassii et Aluminii Sulfas.*
Borax for *Sodii Biboras.*
Cerussa for *Plumbi Subcarbonas.*
Kermes for *Antimonii Oxysulfidum.*
Tartarus for *Potassii Bitartras.*
Tartarus ammoniatus, natronatus, ferratus, stibiatus, for the well-known compound names, which, in spite of the greatest endeavor, could not be brought into general use. And if this suggestion should find no favor, they might, at least, be entered in alphabetical order, not only in the index, but also in the text, as, for instance, Alumen, *vide* Potassii et Aluminii Sulfas, etc.; for by their explicitness, brevity and long use, they have won for themselves an incontestable position in the medical language which cannot be denied them by any law.

I will make my next proposition interrogatory: By what title should substances such as *Gummi Arabicum*, *Radix Scillæ*, or *Folia Coca*, etc., be entered?

In the beginning of the present century the rule was adopted by the Pharmacopœia gallica, bavarica, saxonica, and borussica, iv., to give, in the case of medicaments derived from the vegetable kingdom, the name of the botanical source, as, for instance, Arnicæ flores, Arnicæ radix, and, indeed, upon the suggestion of *Link*, who was one of the most prominent teachers in medical pharmaceutical schools of the present century, it was decided, in cases where there was a difference between the *official* botanical name and the *system-*

atic one, to give the former the preference. By this means the classification was simplified in such cases where officinal parts of plants were derived from various species of the same natural order, as, for instance, in the case of Artemisia (A. Absinthium, A. Abrotanum, A. vulgaris, A. Dracunculus). Later on, however, this rule fell into disuse again, preference being given to the old-established custom of grouping according to Flores, Herbæ, Radices, etc., until in more recent times these groups were again subdivided upon a scientific basis (the flowers into *flores* and *petala*, the herbs into *folia*, *herbæ*, and *summitates*, the roots into *radix*, *rhizoma*, *bulbus*, and *tuber*), and the various parts of plants were again very much scattered in the *alphabet* of the Pharmacopœia. This fact would justify the re-adoption of that first-named rule, providing the utmost care is taken not to give *too great a generalization* and thereby complicate matters, especially for the physician, who is rarely thoroughly at home in the field of systematic botany; indeed, there are cases where the pharmacist would not know for the instant, what to look for under the title Acacia, or Geum, or Erythroxylon, etc.

I, therefore, take the liberty again to call attention to the above-named principle, suggested by Link, and to speak in favor of using for a title, wherever possible, the official botanical name, in preference to the systematic one, where they differ from one another. For instance:

Caryophyllata in place of *Geum*.
Coca in place of *Erythroxylon*.
Nux vomica in place of *Strychnos*.
Ratanhia in place of *Krameria*.
Pichurim in place of *Nectandra*.

This would apply also to Ammoniacum, Galbanum, Asafœtida, Myrrha, etc.

Then would *Gummi Arabicum* again appear under its proper title and not under the title *Acacia*, for which, at the best, no future can be prophesied; to accord with this, *Tragacantha* should have been entered as *Astragalus*. My experience indicates that the hope to bring such new expressions as *Mucilago Acaciæ* into practical use is vain; for, although the young physicians trained in the universities have their attention directed to the new and legally introduced names, they speedily forget them in the intercourse with

their older colleagues, where they come in contact only with the older, fluent, and *appropriate* name.

As regards the groups *Aquæ*, *Liquores*, *Spiritus*, *Tincturæ*, all attempts to characterize them sharply and distinctly have been in vain.

If *aquæ* were to be defined as *indifferent waters*, then *aqua ammoniæ*, *calcis*, *chlori* would have to be excluded therefrom.

Should the term *liquores* be explained as *salt solutions*, then the gas solutions, *Liq. ammon. caust.* and *chlori* could not retain their places in this group; chlorine water and water of ammonia would then belong neither to *aquæ* nor to *liquores*.

The mineral waters would have to be designated as liquores, as the bitter waters, for instance, are salt solutions, and certainly not indifferent waters.

Spiritus would properly be designated by *alcoholic fluids* and *tincturæ* by *alcoholic plant extractions;* but how about *Tinctura iodi?* In short, it will easily be seen that in every such attempt a number of exceptions will at once present themselves.

For these reasons I would prefer strictly to follow the custom, which, in such cases as Tinctura iodi, seems almost peremptory. Of course, it is evident that this is no tincture from a pharmaceutical point of view, although it is a tincture according to the accepted meaning of the word, being a colored liquid. One way of expressing what is meant would be *Solutio iodi;* but then Solutiones would have to be introduced. It could, in preference, be called Spiritus iodi, in conformity with Spiritus camphoræ, which is also only a simple solution.

In want of a more acceptable characterization, therefore, it would, with these groups, be best to adhere to the time-honored, best known names.

Philology.—In looking over the report of the revision of the U. S. Pharmacopœia published in 1880, I noticed that in indicating the acid character of salts—for instance, Sulfas, Phosphas, Nitras, etc.—the *feminine* was used, and, although this was afterwards changed to the masculine in the U. S. Pharmacopœia, the Pharmacopœia Britannica has *retained* the feminine gender.

It might be well to call attention to the fact that in Latin the sub-

stantive endings *as*, *atis*, are used exclusively in the names of a few peoples and the inhabitants of cities, and that these are considered fundamentally masculine, although, of course, women as well as men were included. Romani meant both men and women.

There is, therefore, no good reason for departing from the custom in the masculine designation of salts, which was introduced by Berzelius, but to write exclusively phosphas alb*us* and not alb*a*, and the more so as the word *Sal* is used in the masculine as well as the neuter gender, but never in the feminine. In French, also, it is *le* sulfate.

The spelling of sulfur with an *f* instead of *ph* is justified by the fact that *ph* is of Grecian origin and was not adopted by the Romans, and, in fact, all modern languages of Roman origin have continued in this course, and always use *f* instead of *ph*, as *sulfate*, *sulfato*, etc. The etymology of *phosphorus* is uncertain; therefore, in that the *ph* may stand.

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph.G.

Creosote pills.—1·0 magnesia and 2·0 glycerin are triturated and 10·0 creosote gradually added; the following substances are then incorporated in the order named: 5·0 magnesia, 5·0 powdered licorice extract and q. s. (16·0–18·0) powdered licorice root; the mass is divided into 100 pills. The pills, when pressed on a piece of white paper, do not cause an oily stain; immersed in water they readily soften and disintegrate. *Tar pills*, which have recently been prescribed to some extent, can be made by the above formula, substituting 10·0 tar for the creosote.—E. Dieterich, *Pharm. Centralhalle*, 1893, 633.

Thiosapol preparations are soaps containing sulphur in chemical combination. *Thiosapol cocoa-nut oil soap* (containing about five per cent. sulphur) is made by heating 1 kg. linseed oil with 166 gm. sulphur to 120–160° C. until solution is effected and no separation of sulphur occurs on cooling; one kg. of this product is melted with one kg. cocoa-nut oil, and when cooled to 25° C., is incorporated with one kg. of solution of soda (35 per cent.) and allowed to stand until complete saponification takes place. *Thiosapol-sodium*, containing 10 per cent. sulphur, can be made by heating one kg. oleic acid and 120 gm. sulphur, the resulting product is

then thoroughly mixed with 600 gm. solution of soda (25 per cent.) and the excess of liquid later removed by expression; the sulphurated oleic acid may also be dissolved in two kg. 90 per cent. alcohol, saponified by the addition of 430 gm. solution of soda (35 per cent.) and the filtrate evaporated to dryness on a water-bath at 50° C.—*Pharm. Ztg.*, 1893, 663.

Test for sesame oil.—If five volumes of the oil be agitated with one volume of Bettendorf's reagent and heated in a water-bath for a few minutes a deep wine red color is imparted to the reagent. Olive oil containing a very small quantity of sesame oil will give rise to a red coloration; pure olive oil only causing an orange yellow coloration.—P. Soltsien, *Pharm. Ztg.*, 1893, 654.

The extraction of volatile oils from flowers is effected by G. Morpurgo, by arranging a series of boxes containing the odorous material which are alternately connected with Woulff's bottles partly filled with a purified vaseline oil. By means of an air pump air is first purified, by passing it through an alkaline solution of pyrogallol (this solution absorbs part of the atmospheric oxygen and the resulting mixture of nitrogen and oxygen has been found to exert very little effect in altering the oils, thus it was possible by this method to extract the oils from violets which could not be done by simply using air), and then it enters the bottom of the box filled with the material and, becoming charged with the vapor of the essential oil, escapes above, and passes into the Woulff's bottle giving up the essential oil vapor to the mineral oil; the air then enters a second box, etc. The material after wilting is removed and replaced by fresh; the mineral oil afterwards is made to give up the essential oil to deodorized alcohol. By spraying some of the flowers with alcohol the extraction was greatly facilitated, in some cases as in tuberoses, heliotrope, etc., this procedure on the contrary is detrimental.—*Pharm. Post*, 1893, 405.

Iridin, a glucoside existing in the root of Iris Florentina, was prepared by mixing the alcoholic extract with warm water, and adding a mixture of acetone and chloroform, having a specific gravity of 0950; upon standing the mixture separates into two layers, in the heavier of which the glucoside is suspended as amorphous, white floccules which can be crystallized from boiling diluted alcohol, in white needles, becoming yellow in moist air, and melting at 208°; hot

alcohol, acetone and water will dissolve it, especially the first two; the acetone solution is precipitated by chloroform. Cold, dilute acids do not decompose it, but the alkalies produce deep yellow solutions containing alteration products; hot diluted acids in the presence of alcohol decompose it according to the reactions $C_{24}H_{26}O_{13} + H_2O = C_6H_{12}O_6 + C_{18}H_{16}O_8$, the last formula represents *irigenin* which is well crystallizable, melts at 186°, has the properties of a phenol and gives with ferric chloride an intense violet color. Irigenin, with strong alkalies, yields formic acid, *iridic acid* $C_{10}H_{12}O_6$, and a phenol $C_7H_8O_4$ called *iretol;* iridic acid above its melting point, 180° C., yields carbon dioxide, and the phenol *iridol* $C_7H_5(OCH_3)_2OH$ which melts at 57° C.—(*Berichte*) *Apotheker Ztg.*, 1893, 523.

Glucosides of alcohols.—If gaseous hydrochloric acid be passed into a methyl alcohol solution of glucose, which is kept cold by refrigeration, the mixture after a short time loses the power of reducing Fehling's solution and will yield a well crystallizable product having the formula $C_6H_{11}O_6 \cdot CH_3$. This reaction is characteristic for all alcohols which dissolve glucose; alcohols which do not dissolve glucose will still give the reaction if the glucose be replaced by acetic chlorhydrose, which is easily soluble in ether, chloroform and benzole and by the gaseous hydrochloric acid decomposes, yielding glucose as one product, which then unites with the alcohol as above. The derivatives of ethyl and methyl alcohol with mannose, galactose, glucoheptose, arabinose, xylose, rhamnose and fructose were obtained; sugar of milk (lactose) and maltose do not follow the rule because of their aldehydic character. This class of compounds react very much like the natural glucosides; while boiling alkalies, phenylhydrazine and Fehling's solution produce no change; boiling with dilute acids decomposes them into the components. Interesting is the fact that some of these compounds have a sweet others a bitter taste, and hence the possibility that the so-called vegetable bitter principles may belong to this class. The name proposed for the class is simply to change the *ose* of the sugar into *osid* and precede this term by the name of the alcohol radical as methyl glucosid, ethyl arabinosid, etc.—Emil Fischer (*Berlin. Akad. d. Wissensch.*) *Chem. Repert.*, 1893, 234.

Chionanthin, a glucoside from chionanthus virginica, was isolated by extracting the root with hot petroleum ether; after distilling off

the solvent the residue separated white, partly crystalline, partly amorphous crusts, which, after washing with cold alcohol were dissolved in boiling alcohol, when upon the cooling of the solution the glucoside separated. It is only slightly soluble in cold water and alcohol, but is soluble in hot water and hot alcohol; it has the formula $C_{22}H_{28}O_{10} + 2H_2O$ becomes anhydrous at 110° C. and at higher temperature is colored red-violet, and melts, forming a transparent, glassy mass; dilute acids yield dextrose, and a red-brown resinous substance, soluble in ether and alcohol, this decomposition is attended by a strong odor, recalling balsam of Peru. A preliminary examination of the bark gave indications of alkaloids with Mayer's reagent and potassium tri-iodide; the aqueous decoction with lead subacetate gave a copious precipitate which after washing with water and alcohol was decomposed by hydrogen sulphide; after filtering and evaporating a yellowish powder was obtained, soluble in hot water, but precipitating again upon cooling, this aqueous solution gave the alkaloidal indications; it is soluble in alkalies and alkaline carbonates. Saponin was tested for, but without confirmatory results.—W. von Schulz, *Pharm. Ztsch. f. Russl.*, 1893, 579 and 593.

Resorbin, a new ointment base, is an emulsion of sweet almond oil, containing a small quantity of wax, with a dilute aqueous solution of gelatin or soap.—*Pharm. Centralhalle*, 1893, 688.

Sanguinal, a blood-forming medicament, contains 10 per cent. of pure oxyhæmoglobin, 46 per cent. of the salts existing in the blood, and 44 per cent. of freshly-peptonized muscular albuminoids.—*Pharm. Centralhalle*, 1893, 687.

Phosphorus is prepared by a process patented by Rossell, of Bern, by which glacial phosphoric acid or alkaline metaphosphates are heated with metallic zinc or aluminum, the metals dissolve in fused acid or its salts, and phosphorus distils over; this reaction takes place at a low red heat, whereas in the older process of reducing the metaphosphate with carbon a very intense heat was necessary.—*Südd. Apotheker Ztg.*, 1893, 538.

Somatose is a meat preparation containing large quantities of albumoses with very little peptone; it is claimed to be more easily assimilated, and more agreeable, than the usual meat preparations containing considerable peptones.—Dr. F. Goldmann, *Südd. Apotheker Ztg.*, 1893, 529.

Quercitrin and similar principles have been investigated by U. Rudolph, with a view of establishing their identity or points of difference. The yellow coloring principles of the following plants were made according to the directions of the discoverers: (1) Quercitrin bark (quercitrin). (2) Sophora japonica (sophorin). (3) Viola tricolor var. vulgare (viola-quercitrin). (4) Æsculus hippocastanium (æsculus-quercitrin). (5) Capparis spinosa (capparis-quercitrin). (6) Thuja occidentalis (thujin). The composition of these principles is expressed by the following formula, showing that a close relationship exists between some of them: (1) $C_{21}H_{20}O_{11}$; (4) $C_{21}H_{22}O_{12}$ or 1, with one molecule H_2O; (2), (3) and (5) have the formula $C_{27}H_{30}O_{16}$; (6) has an intermediate formula and differs also in that the decomposition product *thujetin* yields reactions differing from those obtainable with the decomposition products of the other five principles. (1–5) inclusive, by hydrolysis, give isomerous products having the formula $C_{15}H_{10}O_7$, but which are not considered identical because of differences in melting points and solubilities. The hydrolyses are indicated by the two following reactions: $C_{21}H_{20}O_{11} + 2H_2O = C_6H_{14}O_6 + C_{15}H_{10}O_7$; $C_{27}H_{30}O_{16} + 3H_2O = C_6H_{14}O_6 + C_6H_{12}O_6 + C_{15}H_{10}O_7$. The isodulcite ($C_6H_{14}O_6$) showed some differences in crystalline form; in (2), (3), (5) and (6) the isodulcite is accompanied by a fermentable sugar. Notable differences are apparent when the amounts of sugar and isodulcite (expressed as isodulcite) and the quercetin-like bodies (quercetin, sophoretin and thujetin) obtained by hydrolysis are compared.

	1. Per Cent.	2. Per Cent.	3. Per Cent.	4. Per Cent.	5. Per Cent.	6. Per Cent.
Isodulcite, . . .	38·99	57·16	55·78	36·83	56·73	38·16
Quercetin, etc., .	68·68	49·54	51·86	65·65	49·61	62·25

—(Jurjew-Dissertation), *Pharm. Post*, 1893, 529.

Birch- and *Fir tar* show the following properties according to an examination by E. Hirschsohn: *Birch tar*, at 20° C. has a specific gravity of 0·926–0·945 for the better grades and 0·953–0·987 for inferior grades. The aqueous solution, obtained by agitating one part tar with ten parts water, is almost colorless, has an acid reaction, and is colored green with ferric chloride (1 : 1,000); 5 cc. of the aqueous solution with 2–3 drops aniline and 4–6 drops hydrochloric acid gives a yellow mixture; if the birch tar be adulterated with fir tar or other kinds of tar a red mixture results. Birch tar

with twenty volumes of benzin imparts to the latter only a pale-yellow color; the benzin solution agitated with an aqueous copper acetate solution (1 : 1,000) should not take a greenish color. *Fir tar* has a specific gravity at 20° C. of 1·02–1·15; the aqueous solution (1 : 10) has a yellowish color, an acid reaction, and with ferric chloride gives a red coloration; 5 cc. of the aqueous solution with aniline and hydrochloric acid gives a red mixture which when agitated with chloroform imparts to the latter an intense red color. The benzin solution agitated with aqueous copper acetate causes a green coloration. Fir tar is perfectly soluble in nine volumes of 90 per cent. alcohol; a turbid mixture indicates admixtures with birch tar, kerosene.—*Pharm. Ztschr. f. Russl.*, 1893, No. 42.

Test for glucose.—3–4 cc. of a sugar solution boiled for one minute with 0·12 iodic acid and 0·2–0·4 sodium hydrate, allowed to cool, acidified with dilute hydrochloric acid and ammonium hydrate added so as to form a layer will cause a dark precipitate, a combination of nitrogen and iodine. This test is characteristic for glucose and is not given by ketones and aldehydes in general; the test may be useful in the examination of urine for sugar, as normal urine does not give the reaction.—A. Jaworowsky (*Wiadomoszy Farmaceut.*), *Pharm. Post*, 1893, 549.

Gurjun balsam in copaiba balsam may be detected by two methods proposed by E. Hirschsohn, in *Pharm. Ztschr. f. Russland*, 1893, No. 43.

If 2–4 drops of the suspected balsam be added to 1–2 cc. of a solution of 1·0 pure concentrated sulphuric acid in 25·0 pure acetic ether no red or violet coloration should be produced. The different varieties of copaiba with this test give only a yellow or pale brownish-yellow color, but the addition of 10 per cent. Gurjun Balsam to copaiba causes a red coloration gradually changing to a reddish violet. A second method of applying the test was devised after ascertaining that the substance causing the red color is at least partly soluble in water. One volume of the balsam is agitated several times at the ordinary temperature with 3–4 volumes of water, filtered through a wetted filter and the filtrate mixed with an equal volume of hydrochloric acid of specific gravity 1·12; no red coloration should develop in the course of fifteen minutes. Pure copaiba by this modification fails to give any color, but if containing 10 per

cent. gurjun balsam the red color develops in a few minutes; if containing 20 per cent. gurjun balsam the color is more intense and is more quickly developed.—*Apotheker Ztg.*, 1893, 565.

Scoparin, isolated from the aqueous extract of Spartium Scoparium, by Stenhouse, has the formula $C_{19}H_{16}O_8(OH)(OCH_3)$ (and not $C_{21}H_{22}O_{10}$); it melts at 202° if heated slowly, at 219° if heated rapidly. It crystallizes from 70 per cent. alcohol in yellow needles containing $5H_2O$ and becomes anhydrous at 105° C.; it is soluble in hot water, the solution reducing alkaline copper and silver solutions. Scoparin is not a glucoside as by hydrolysis it yields no sugar, but a brownish yellow substance melting with decomposition at 260–270°, having the formula $C_{20}H_{16}O_8 + 2\frac{1}{2}H_2O$. The difficultly soluble modification of scoparin, which is obtainable by boiling the above described substance with alcohol, forms a yellow powder melting at 234–235° C., and can be changed into the first form by dissolving in alkali and supersaturating with acid.—Goldschmidt and v. Himmelmayr (*Monatsh. f. Chem.*) *Apotheker Ztg.*, 1893, 566.

Extract of male-fern prepared without the use of copper utensils has a yellowish-green color; if prepared in a copper vessel this normal color is changed to a pure green, and, hence, Peters recommends the examination for copper in all pure green colored extracts.—*Apotheker Ztg.*, 1893, 594.

Irone, an odorless principle, has been isolated by Tiemann and Krüger from orris root which is known to possess the aroma of violets, it is a methylketone, having the formula $C_{13}H_{20}O$. An isomeric ketone was prepared synthetically from citral, the odorous principle of lemon oil and which is also present in other oils. This ketone is called *ionone*, it has an odor very much like that of irone, but is a little milder and recalls the odor of flowering violets; it is believed that one of these substances is present in violets, but the quantity is so exceedingly small that this proportion is only possible on a large manufacturing scale.—(*Berliner Akad.*) *Pharm. Ztg.*, 1893, 699.

Caffein-sulphonates have recently been recommended by Heinz and Liebrecht as an unobjectionable, safe diuretic, especially in the treatment of dropsy. The sodium salt has been called by the name *nasrol*; recently the manufacturing firm having placed upon the

market the sodium salt under the name of Symphorol N; the lithium salt is called Symphorol L, the strontium salt Symphorol S. —*Pharm. Ztg.*, 1893, 704.

Loretin or m-Jodo-o-oxychinoline-ana-sulphonic acid a substitute for iodoform and carbolic acid, forms a yellow crystalline powder which is difficultly soluble in water and alcohol and insoluble in ether oils; suspended in collodion and oils it is useful for certain purposes; mixed with a few per cent. of magnesia it can be used as a dusting powder. With the alkalies it forms orange red salts soluble in water, a 2–5 per cent. solution of the sodium salt can replace carbolic acid water as a wash. The calcium salt is insoluble and can be precipitated upon gauze by first impregnating the gauze with the sodium salt and then immersing in solution of calcium chloride.—*Pharm. Ztg.*, 1893, 746.

Gymnemic acid is recommended by Dr. V. Oefele as a means of counteracting the disagreeable sweet or bitter taste so noticeable in cases of diabetes. As a convenient mode of administering the acid 0·1 gm. is dissolved in sufficient alcohol so as to impregnate 4 gms. Pekoe tea leaves; one or two leaves are placed in the mouth several times a day, as necessary.—*Rundschau*, 1893, 996.

ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

Benzoylcinchonine is prepared by E. Leger by the following process which is a modification of Schützenberger's process, published in 1858: 50 gm. of precipitated and dried cinchonine are introduced into a vial with 30 gm. benzoyl chloride; close the vial and heat on a water-bath for an hour, when the reaction is finished, take up the viscous product with water; add to this solution an excess of NH_3 and agitate with ether. The ethereal solution is washed with water, concentrated by distillation, and allowed to rest for a day. Now decant the ethereal solution of benzoylcinchonine, evaporate, and place the viscous product under a bell-glass over sulphuric acid. When it has completely solidified, pulverize it, redissolve in ether, filter and concentrate the solution when, after twenty-four hours, the benzoylcinchonine will crystallize out. It is insoluble in water, but forms syrupy solutions with alcohol and ether, from which it does not again crystallize; it is much less soluble in absolute ether. It

combines with acids to form basic and neutral salts. Benzoylcinchonine is feebly lævogyre and the rotary power of its acid solutions is inferior to that possessed by the alcoholic solutions, and diminishes as the quantity of acid is increased.

The author has likewise prepared and studied a number of salts of this base.—*Jour. de Pharm. et de Chim.*, November, 1893, p. 405.

Guaiacol, used as a protective, has been studied in its effects by L. Guinard, who concludes that the lowering of the temperature which has been noticed upon using guaiacol for this purpose is not due to the absorption of the medicament by the skin; the rapidity of the action being sufficient proof, although it is possible after a time through its local action upon the epidermis. The presence of guaiacol in the urine of patients, upon whom it has been used as a protective is due to its vapors penetrating the respiratory passages, although this quantity is not sufficient for producing the lowering of temperature. In noting the local and general effects of guaiacol it is necessary to take into consideration: (1) The quality of the product; (2) the susceptibility of the individual, and (3), his state of health; there is little effect upon the temperature of apyretic subjects. The local effect of guaiacol is more pronounced if the part protected is excluded from the air by an impermeable covering.—*Bull. Gén. de Therap.*, October, 1893, p. 339.

Sulphur ointment, associated with oil of cade and green soap, is used by Hébra, in the treatment of prurigo, and the following has been formulated by him: sulphur, 15 gm.; oil of cade, 15 gm.; green soap, 30 gm.; lard, 30 gm., and prepared chalk, 10 gm.—*Rev. de Thér. Med.-Chirurg.*, November, 1893, p. 581.

Reagent for detecting albumin in urine.—The reagent (Spiegler's) consists of the following: Bichloride of mercury, 2 p.; tartaric acid, 1 p.; distilled water, 50 p.; glycerin, 5 p. The urine is strongly acidulated with acetic acid, filtered, and by means of a pipette the filtered liquid is introduced into a test-tube containing 2 cc. of the reagent. If albumin is present a white ring will appear at the point of contact. The reagent will detect 1:350,000.—*Boll. Chim. Farm.; L'Union Pharm.*, November, 1893, p. 495.

Volumetric estimation of calcium, strontium and barium.—The following process, based upon the property possessed by alkaline carbonates, of precipitating the oxides of the fourth group, occupies

but a few minutes and is, according to the author, M. Vizern, absolutely exact. The perfectly neutral solution of the salt to be estimated, to which a few drops of an alcoholic solution of phenolphthaleine are added, is heated to near the boiling point and then an alkaline carbonate solution (53 gm. sodium carbonate per liter) is added drop by drop, from a graduated burette, until a permanent rose-red tint is produced. Note the quantity used and calculate.

1 cc. normal alkaline solution = 0·02 gm. calcium.
1 cc. " " = 0·04375 gm. strontium.
1 cc. " " = 0·0683 gm. barium.

The process, however, cannot be applied if the liquid contains any other substance precipitable by the alkaline carbonate. Following are some of the results obtained by the author:

	Estimation by Weight.	Volumetric Estimation.
Barium,	1·244 gm.	1·253 gm.
Strontium,	0·697 gm.	0·7087 gm.
Calcium,	0·638 gm.	0·642 gm.

—*Jour. de Pharm. et de Chim.*, November, 1893, p. 442.

Creosotal is the carbonate of creosote, containing 90 per cent. of pure creosote, rich in guaiacol; it is a thick liquid and has a neutral reaction; is insoluble in water, but soluble in four or five parts of cod-liver oil or olive oil. The daily dose for a child is 1–6 gm., and 4–15 gm. for an adult. It can be made into an emulsion by beating ½–2 teaspoonfuls with the yolk of an egg and diluting with sweetened and aromatized water.—*Jour. de Pharm. d'Anvers.*, November, 1893, p. 415.

Vasogen or oxygenated vaseline, which is a mineral oil treated with an excess of hydrogen dioxide, forms an emulsion with water upon treatment with alkalis. It is a good excipient for iodoform, creosote, ichthyol, menthol, pyrogallol, chrysarobin, etc., but as it loses the property of forming an emulsion by the action of heat, these must be incorporated during the process of preparation.—*Ibid.*, p. 416.

Nasrol, the sulphocaffeinate of sodium is recommended as an energetic diuretic; it has a bitter taste, is very soluble in boiling water, but only slightly soluble in cold water.—*Ibid.*, p. 416.

Lanaine, which is extracted from wool, is a clear, yellow heterogeneous fat, fusible near 36° C., neutral and permanent in air; it is easily soluble in ether, benzene, chloroform and acetone; but

difficultly soluble in cold alcohol; it is composed principally of fatty acids, cholesterin and isocholesterin, which are saponified with potassium and sodium in alcoholic solution, but not in aqueous solution.—*Ibid.*, p. 417, from *Rép. de Pharm.*

Cristalline is a kind of collodion, in which the ether and alcohol, employed as solvents for pyroxylin, are replaced by methyl alcohol. It differs from collodion, in that the solvent evaporates more slowly, and in forming a transparent film, which allows the part it protects to be seen and the progress of the treatment followed. An elastic cristalline can be obtained by adding 20 gm. cristalline to 5 gm. castor oil and 10 gm. Canada turpentine. Cristalline dissolves pyrogallic and salicylic acids, chrysarobin and many other medicaments. The only disadvantage of its use is its odor.—*Semaine médicale*, October 18, 1893.

Copaiba has been found to act as a powerful diuretic, especially in cirrhosis of the liver, by Dr. Bronowsky, who administered in twenty-four hours, 6 gm. in emulsion with extract of peppermint. Copaibic acid was passed in the urine after the first day of the treatment, while the maximum diuretic action was reached on the third or fourth day.—*Gaz. lek.;* through *Nouv. Remèdes*, November, 1893, p. 504.

That quinine salts are incompatible with asaprol has been shown by Edhem Ismaïl, who says (Rép. de Pharm., November, 1893, p. 487) that when a solution of a basic or neutral quinine salt (the sulphate or the hydrochlorate) is poured at once into a solution of asaprol, a resinous body appears on the surface of the liquid, which is insoluble in water and soluble in 90 per cent. alcohol. If an asaprol solution is gradually added to a solution of a quinine salt, a white precipitate is deposited in the bottom of the tube, and becomes soft and grayish.

Iodocaffeine is obtained by dissolving in the cold a mixture of 35 parts of sodium iodide and 65 parts of caffeine iodide, in sufficient water, treating this solution with hydrogen sulphide and evaporating to dryness.

Iodotheine is obtained by a similar process, while the preparation of *iodotheobromine* is more difficult, on account of the insolubility in water of theobromine; to obtain this compound a concentrated solution of salicylic acid is added to the mixture of sodium iodide

and theobromine. The author, M. Rummo, has also studied the physiological action of these three compounds and finds that they each exercise a special action on the heart.—*Sem. méd.; Rép. de Pharm.*, November, 1893, p. 495.

A ferment present in fungi.—Em. Bourquelot examined a large number of species of fungus, which he enumerates, for the purpose of solving the question as to how these growths, especially such as are parasites or saprophytes, assimilate and utilize the substances which enter into the composition of the organism upon which they exist. The author found a ferment, analogous to emulsin, present almost exclusively in such fungi as are parasite upon trees or grow upon old wood.—*Jour. de Pharm. et de Chim.*, November, 1893, p. 385.

Test for sesame oil in butter.—A. Jorissen calls attention to the fact that butter which is colored with curcumin, but contains no foreign fats, also responds to Baudoin's test, which has been applied for the detection of sesame oil, that is a violet coloration with hydrochloric acid in presence of sugar; but as it also shows this coloration with hydrochloric acid alone, the filtered fatty body should first be subjected to this test, before applying Baudoin's test.—*Jour. de Pharm. d'Anvers*, September, 1893, p. 321.

ASSAY OF ALKALOIDAL DRUGS.[1]

By C. C. Keller.

Alkaloidal assaying has received a valuable contribution in the work of C. C. Keller, which appeared in a publication commemorating the fiftieth anniversary of the organization of the Swiss Apothecaries Association. *Nux Vomica.*—15 gm. of the dried and finely powdered seeds are placed in a small extraction tube (12 cm. long, 25 mm. wide, terminating in a delivery tube 7 mm. wide and 5–6 cm. long, the end of which is ground obliquely; the upper end of the extraction tube is ground so that it can be covered with a small glass plate), uniformly packed and percolated with ether (this is facilitated by connecting the apparatus with an air-pump until the ether reaches the small plug of cotton) allowing the percolate to drop into a vial

[1] Translated and abstracted for the American Journal of Pharmacy, by F. X. Moerck, Ph.G.

of 150 gm. capacity until 10 drops of the percolate leave no residue upon evaporation, which requires about 100 cc. ether and from 30 to 90 minutes according to the fineness of the powder. (To determine the amount of alkaloid extracted in this treatment by the solubility of the alkaloidal salt in the fixed oil solution, the ethereal solution was agitated with an excess of $\frac{n}{10}$ hydrochloric acid, the greater part of the ether decanted and the residual liquid titrated with $\frac{n}{10}$ ammonia using iodoeosin as indicator (*Am. Journ. Pharm.*, 1892, 521). The rather remarkable observation was made in this connection that using the unpeeled nux vomica about 24 per cent. of the total alkaloid was found in the yellow ethereal solution against only 7 per cent. in the case of peeled nux vomica yielding a colorless filtrate; the fat averaging 3·15 per cent. The extraction tube is next placed on a dry, tared vial of 250 gm. capacity, the cotton plug pushed into the vial and the drug washed in with ether adding of the latter to make up to 100 gm.; after adding 50 gm. chloroform and thoroughly agitating 10 cc. ammonia water (10 per cent.) are added and the mixture shaken repeatedly during half an hour. In the meantime the ethereal fat solution is agitated with 5 cc. $\frac{n}{10}$ hydrochloric acid and 10 cc. water, pouring off the ether as far as practicable and securing a complete separation by the use of a separating funnel which is then washed with several portions of water so that the acid solution and washings measure 25 cc. This acid liquid is added to the mixture in the vial, shaking for several minutes, and after the separation into two layers 100 gm. of the ether-chloroform solution are poured (if necessary through a small filter moistened with the solvent) into a tared Erlenmeyer flask and the solvent distilled off. The alkaloids remain as a colorless varnish which is freed with difficulty from the chloroform by heat, but which can be easily effected by covering the alkaloids several times with small quantities of alcohol which is then boiled away in a water-bath; the alkaloids during these operations become crystalline and can be dried to constant weight at a temperature *not exceeding* 95–100° C. The alkaloids can then be titrated by dissolving in 5 cc. chloroform with the aid of a little heat, adding 40 cc. ether, 10 cc. water, one drop of an alcoholic iodoeosin solution (one per cent.) and 10 cc. $\frac{n}{10}$ hydrochloric acid; after agitation the excess of acid is titrated with $\frac{n}{10}$ ammonia until a permanent red color appears in the aqueous solution; after each addition of ammonia the flask must be corked

and agitated; 1 cc. $\frac{n}{10}$ acid is taken as the equivalent of 0·0364 gm. alkaloid. The following table exhibits the results:

	ALKALOIDS.		
	By Weighing. Per Cent.	By Titrating. Per Cent.	Difference. Per Cent.
(1) Unpeeled, ...	2·640	2·548	0·092 = 3·50
(2) Unpeeled, ...	2·685	2·611	0·074 = 2·01
(3) Peeled, ...	2·855	2·795	0·060 = 2·10
(4) Peeled, ...	2·780	2·725	0·055 = 2·18

The difference between weighing and titrating is so slight that the former suffices for practical pharmaceutical purposes and enables the assay to be completed in less than three hours. It is important to adhere to the use of two parts ether and one part chloroform in the extraction, since a larger proportion of chloroform increases the yield of crude alkaloids (probably caused by solution of the glucoside loganin; the red color obtained by warming the crude alkaloid with dilute sulphuric acid indicates this), and hence, a greater difference is shown between the weighed and titrated alkaloids. The use of a greater proportion of ether risks loss of alkaloids by crystallization since the alkaloids are almost insoluble in pure ether. The fear that the peeled nux vomica contains a considerably higher percentage of alkaloids than the unpeeled appears groundless from the results of the analyses quoted; for pharmaceutical purposes the peeled nux vomica is preferable because of its advantages in making tincture and extract.

Strychnos bark is assayed as the seeds with the difference that the bark is first percolated with a mixture of ether and chloroform; these solvents extract only traces of alkaloid, but leave a dark greenish brown residue of chlorophyll, fat, wax, etc., amounting to 0·93 per cent. of the bark. The yield of alkaloids is higher than in the seeds, three determinations giving 4·55–4·56 per cent.; the alkaloids were obtained as a yellowish varnish which required treatment with four portions of alcohol before a crystalline appearance was noted; the residue was obtained of constant weight after considerable difficulty due to the preponderance of brucine; by a method to be described there was found in the alkaloidal residue, strychnine 33·6 per cent., brucine 66·4 per cent.

The dry alcoholic extract of nux vomica was assayed by placing 1·5 gm. of the dry, finely powdered extract in a vial of 150 gm. capacity containing 10 gm water, agitating until a uniform mixture

is obtained, adding 30 gm. chloroform and 60 gm. ether, and, after agitating, 5 cc. ammonia water (10 per cent.) The mixture is agitated for several minutes, and the vial set aside; after 15–30 minutes the mixture will separate so that 60 gm. of the chloroform-ether solution can be transferred to an Erlenmeyer flask, filtering if necessary, and the assay finished as already described. An extract made by himself from the unpeeled seeds (which had previously been extracted with ether), and 70 per cent. alcohol yielded 12 per cent. extract containing 21·2 per cent. alkaloids; two commercial extracts yielded 14·3 and 16·2 per cent. alkaloids.

The quantitative separation of strychnine and brucine is effected by a modification of Gerock's method, and is dependent upon the alteration of brucine sulphate by dilute nitric acid into compounds having no basic character, while strychnine sulphate suffers very little or no decomposition under the same circumstances. 0·2–0·4 gm. of the purified alkaloids (the crude alkaloids are dissolved in dilute sulphuric or hydrochloric acid with the aid of heat, the solution filtered and extracted with a mixture of 3 parts chloroform and 2 parts ether after adding ammonia in excess: the chloroform-ether solution leaves the alkaloids colorless and perfectly soluble in dilute acids; any loss occasioned in the purification is of no moment, since it is desired to establish only the relative quantity of the two alkaloids) are dissolved in an Erlenmeyer flask in 10 cc. dilute sulphuric acid (10 per cent.), applying heat cautiously so that as little evaporation as possible takes places; after cooling one cc. concentrated nitric acid sp. gr. 1·41–1·42 is mixed with the solution (very frequently the sulphuric acid solution upon cooling deposits crystals of strychnine sulphate which dissolve again on the addition of the nitric acid), producing the well-known red coloration of brucine with nitric acid; the flask is set aside for one or one and a half hours at the ordinary temperature, adding at the expiration of the time 40 gm. chloroform and 40 gm. ether and, after agitation, 10 cc. ammonia water (10 per cent.); the mixture is shaken for several minutes and 40 gm. of the chloroform-ether solution filtered into a tared flask, the solvent distilled off and the residue (strychnine) dried at 95–100° C. and weighed. The crystallization of the strychnine is so sudden that the crystals are thrown around in the flask with considerable violence; to obviate this the distillation should be discontinued as soon as crystallization commences and the remainder of the solvent gotten

rid of by an air-current which also facilitates the final drying. The strychnine is generally of a yellowish color due to traces of adhering coloring matter; it must always be tested for brucine by solution in concentrated sulphuric acid and addition of a small crystal of potassium nitrate, only a pale yellow color being allowable. This method is also satisfactory in testing commercial brucine for strychnine. Six determinations of the strychnine in the alkaloids from nux vomica gave results varying from 45·1–50·6 per cent., and averaging 47·16 per cent., confirming the statement of Beckurts that the two alkaloids are present in about equal parts.

Cinchona bark assays are made by a very much simplified Haubensack-Kuersteiner method (*Am. Journ. Pharm.*, 1891, 347; 1893, 71). 12 gm. of the dried and finely powdered bark are placed in a vial of 250 gm. capacity, 120 gm. ether and after agitation 10 cc. ammonia (10 per cent.) added and the mixture repeatedly shaken during half an hour; if the bark to be assayed is succirubra 10 cc., if calisaya, 15 cc. water are added and the mixture agitated for one minute; 100 gm. of the ethereal solution (which from succirubra is perfectly clear, from calisaya, however, is somewhat turbid) briskly agitated in a flask with 3 cc. dilute sulphuric acid and 37 cc. water and allowed to stand for about ten minutes when a perfect separation will allow of the decanting of the greater portion of the ethereal layer, the remainder is transferred along with the acid solution to a small separator and the acid solution allowed to run off into a beaker and the flask and separator rinsed with 10 cc. water; the acid solution is freed from ether by warming and replaced in the cleansed separator, where it is agitated with a mixture of 30 gm. chloroform and 10 gm. ether along with 5 cc. ammonia water. The chloroform-ether solution is run into a flask and the agitation repeated with 15 gm. chloroform and 5 gm. ether; the united alkaloidal solutions are filtered through a small chloroform-wetted filter into a tared flask and the solvents distilled off. The alkaloids from calisaya are generally crystalline, from succirubra amorphous and retaining chloroform; by the addition of 3 to 5 cc. absolute alcohol and boiling this away in a water-bath the alkaloids are obtained crystalline and capable of being easily dried at 100° C.; a higher temperature is to be avoided. The weighed alkaloids may be titrated by dissolving in 10 to 15 gm. alcohol, adding water until precipitation commences, and titrating with $\frac{n}{10}$ hydrochloric acid

using hæmatoxylin as indicator (1 gm. hæmatoxylin dissolved 100 gm. diluted alcohol with 2 to 3 drops of ammonia). From the results of a large number of assays 1 cc. $\frac{n}{10}$ hydrochloric acid is the equivalent of 0·0315 gm. calisaya alkaloids and of 0·0304 gm. succirubra alkaloids.

Fluid extract of cinchona is assayed by diluting 6 gm. fluid extract with 15 gm. water, adding 90 gm. ether and 5 gm. ammonia water and agitating repeatedly during one-half hour; from 75 gm. of the clear ethereal solution, representing 5 gm. of the fluid extract, the ether is distilled off and the alkaloids weighed at 95 to 100° C. The alkaloids must be titrated by dissolving in 10 gm. alcohol, adding 40 gm. water, two drops hæmatoxylin solution and sufficient $\frac{n}{10}$ hydrochloric acid to produce a permanent yellow coloration.

In assaying *extract of cinchona* 1·5 gm. are triturated with 15 gm. water, transferred to a vial of 150 cc. capacity, 90 gm. ether and 5 cc. ammonia water added, thoroughly agitated during one-half hour and 60 gm. of the clear ethereal solution representing one gram extract proceeded with as above.

The thalleioquin test can be made with these several titrated solutions by diluting 1 cc. with 9 cc. water, adding 2 to 3 drops bromine water and, lastly, 1 cc. ammonia water.—*Oesterr. Ztschr. f. Pharm.*, 1893, 563 and 586.

THE ACTION OF ZINC AND MAGNESIUM UPON METALLIC SOLUTIONS, AND THE DETERMINATION OF POTASSA.

By A. Villiers and F. Borg.

The electrolytic methods which enable us to determine, and often, indeed, to separate, metals are becoming more and more utilized in analytical chemistry. It seems, however, at first sight that we might in a great number of cases substitute for them a more rapid method, which consists in displacing metals by another metal, such as zinc or magnesium.

In reality, this latter procedure is applicable only in a very limited number of cases (copper, gold, platinum). The metals are not, in general, precipitated in a state of purity, but as alloys containing larger or smaller quantities of magnesium or zinc.

The proportion of these latter varies with the acidity of the

liquids and with the weight of the metal employed. Another cause has also a remarkable influence upon this proportion—the degree of purity of the metal. It is thus that the weights of platinum displaced by equal weights of different specimens of zinc in equal volumes of one and the same solution of platinum chloride, have been 100·92, 100·39, 119·12 per cent.; that is to say, the platinum has been precipitated with excesses of 0·92, 10·39 and 19·12 per cent. The first specimen of zinc had been obtained by the electrolysis of an ammoniacal solution of pure zinc sulphate; the second was a distilled zinc, containing no impurities except traces of sulphur not determinable by the balance; the third was commercial zinc, containing 1·1 per cent. of impurities, of which 0·44 was fixed matter.

These results show that zinc cannot be used for the determination of platinum even after a correction for the impurities. When the zinc is impure, the presence of the impurities, even in an infinitely slight quantity, occasions the fixation of a very notable quantity of this metal upon the platinum. Electrolytic zinc gives results which are merely approximate.

Magnesium, as it is found in commerce in the form of ribbons, is, on the contrary, quite suitable for the determination of copper, gold and platinum; and, consequently of potassium, after a precipitation as double platinum-potassium chloride.

Determination of Copper.—When copper is accompanied by no other metals except the alkaline and earthy metals, it may be determined very quickly and easily in the metallic state by treating its solutions with magnesium. The copper is thus liberated, in a slightly acid liquid, in the form of a granular precipitate very easy to wash. The washing is finished with alcohol; the metal is dried at 100° and weighed.

We may make use of a weighed filter, or more simply deposit the reduced copper in a small weighed capsule.

The process is not applicable in presence of metals like zinc easily acted on by hydrochloric acid; there are produced alloys even if the liquids are very acid.

Determination of Potassium.—If we determine potassium in the double platinum chloride, the precipitate is collected, after desiccation, on a weighed filter. Or we incinerate the filter, ignite the precipitate in hydrogen, and determine the platinum in the residue,

after having removed the potassium chloride with water. The former method presents the causes of error inherent in the use of weighed filters. The latter method is tedious, and involves the successive incineration of two filters.

The following method is very rapid and very accurate. The double chloride, obtained in the ordinary manner, is washed with a mixture of equal volumes of alcohol and anhydrous ether, in the capsule in which it has been produced, until the filtrate runs through absolutely colorless—a result obtained with a small volume of the mixture. The residual salt is dissolved in boiling water, collecting the solution in a conical vessel. We add to it a little pure hydrochloric acid, and introduce gradually fragments of magnesium until the liquor is completely decolorized and the magnesium dissolves without its surface becoming tarnished.

The platinum thus deposited is very easy to wash, and does not adhere to the sides of the capsule. It is brought upon a filter without folds; the filter, after desiccation, is incinerated and the platinum is ignited. Its weight, multiplied by 0·3939 or by 0·4747, gives the corresponding weight of potassium or potassa.

This method is very advantageous in the determination of potassa in presence of soda and other substances, except ammoniacal salts. It is sufficient to substitute this method of liberating the platinum for that proposed by Corenwinder and Contamine in their method for the determination of potassa in mixtures, such as salines or refined potash.

By the use of magnesium we have obtained exactly 100 per cent. of the potassa contained in potassium sulphate mixed with large quantities of sodium phosphate and sulphate, calcium, magnesium, and iron chloride, and aluminum sulphate, if we employ for the precipitating and washing the chloroplatinate a mixture of equal volumes of anhydrous alcohol and ether.

In presence of bromides, the precipitate produced by platinum chloride may contain more or less bromine replacing an equivalent quantity of chlorine. Still, a determination of the weight of the platinum will give in this case an exact result.

We must not forget to transform the potassium salts into chloride if the acids are volatile, or, in the contrary case, to acidulate with hydrochloric acid.—*Bull. de la Soc. Chim. de Paris*, Series 3, ix and x, p. 602, through Chem. News, 1893, 264.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 19, 1893.

The meeting was called to order by Prof. Trimble, who nominated Mr. Wm. B. Webb for chairman.

The reading of the minutes of the last meeting was on motion dispensed with.

There being no donations to library or cabinet, the first business was the reading of the paper on the Botany of Columbian Exposition at Chicago, by Henry Kraemer, Ph.G., extracts of which will appear in a future number of the Journal.

The next paper was one upon The Forestry of the Columbian Exposition, by Joseph Crawford, Ph.G. The paper was accompanied with samples of many of the woods dressed and labelled. The uses of the fibre of the *leaves* of the pinus palustris with samples of the various articles were also given by Mr. Crawford. They were oakum fibre, coarse and fine, dyed of various colors, and some matting woven from this fibre used for floor covering. These were exhibited by Mr. Wm. Simpson, of Raleigh, N. C.

A paper upon Resin of Podophyllum, by G. M. Beringer, Ph.G., was read, (see p. 9), also Samples of Syrup of Prunus Virginiana, U. S. P., 1880 and 1890, the former having 5 per cent. glycerin, the latter 15 per cent. glycerin added to the menstruum before displacement. It would seem to be a disadvantage, as it gave a much greater astringency to the syrup and prevented the solution of the sugar.

Wm. B. Thompson, Ph.G., exhibited samples of milk sugar crystallized, made by the American Lactose Company, of Plainfield, N. J.

The enquiry was made as to the use of Lactose, when it was stated to be used very largely by the manufacturers of homœopathic remedies, and also as a component of infant foods as making a much more close imitation of human milk.

An improved Tablet Machine was exhibited by Mr. Leggoe, the manufacturer. The character of the work performed by it was very much admired, and proved the good qualities claimed for it.

There being no further business, on motion adjourned.

T. S. WIEGAND, *Registrar.*

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Salopheu, ein gutes Antineuralgicum und Antirheumaticum.—Von Dr. E. Lutze, Assistenz arzt am Kranken hause zu Barmen. Sonder-Abdruck aus Therapeutische Monatshefte. 1893. Juli.

Salophen, a good anti-neuralgic and anti-rheumatic. By Dr. E. Lutze, assistant physician at the hospital of Barmen. Reprint from Therap. Monatshefte. 1893 July.

Notes on experiments with Salophen conducted at the hospital of Barmen.

Acometric Syllabus.—Diseases and indications in each which may be met by the use of Diurnals and Diurnal Tablet Triturates. By J. O. Becelaere, M.D., Parke, Davis & Co., Detroit, Mich.

Formalin-Schering.

Diabetin-Schering.—Schering & Glatz, New York.

Two pamphlets, descriptive of new agents introduced to the medical profession. Under the first name a 40 per cent. solution of formaldehyde is understood, and the second denotes levulose, which has been introduced as an innocuous and palatable sugar for diabetics.

The Treatment of Myxœdema and other Diseases by the use of certain organic extracts.—Clinical lecture by Hector W. G. Mackenzie, M.A., M.D., etc. Reprint from the Lancet (Eng.), Jan. 21, 1893.

Cretinism Treated by the hypodermic Injection of Thyroid Extract and by Feeding —By Edward Carmichael, M.D., Edin., etc. Reprint from the Lancet Eng.), March 18, 1893.

Two reprints published by Parke, Davis & Co., Detroit, Mich., under the name of Biological Therapeutics.

Contribution à l'Étude des Gommes Laques des Indes et de Madagascar. Albert Gascard. Paris. Société d'éditions scientifiques. 1893.

Contributions to the study of shellac of India and Madagascar.

This thesis, from the Paris school, shows the observations of the author on shellac from India. The other, from Madagascar, is a new article. The resin obtained therefrom yields by oxidation with permanganate of potash in alkaline solution butyric acid and ammonia. In the wax the author shows the existence of cerylic alcohol, etherized with formic acid or oleic acid, and acids containing nitrogen which are found partially in the free state. The thesis is illustrated by one plate of the shellac from Madagascar.

Action des aldehydes sur les Phenol Polyvalents. Acétals Aromatiques. Par Henri Eugène Causse. Paris: Gauthier-Villars et Fils. 1893.

Action of aldehydes on polyvalent phenols. Aromatic acetals.

Sur l'Éthérification de l'Acide Fluorhydrique. Par Maurice Meslans. Paris: George Carré. 1893.

On the esterification of hydrofluoric acid.

Two theses from the Paris school containing items principally of pure chemistry.

Sur un Procédé de Preparation extempoarée des Pastilles de Chocolats Medicamenteux. Par Fr. Gay.

On a process for the extemporaneous preparation of medicinal chocolate pastilles.

Sur le Tannate de Mercure. Par Fr. Gay.

On tannate of mercury.

Sur la preparation et les caractères du Liniment de Rosen. Par Fr. Gay.

On the preparation and characteristics of Rosen's liniment.

Three reprints from nouveau Montpellier médical.

Essai d'une Classification des Opérations et Formes Pharmaceutiques. Par Fr. Gay.

Attempt at a classification of pharmaceutical processes and manipulations.

This is an outline of general galenical pharmacy as taught by the author at the Montpellier school of Pharmacy.

OBITUARY.

Dr. Edward Ligon Enders Castleton, Ph.G., died at Houston, Tex., on Sunday morning, September 17, 1893, aged 33 years. He was born at Baton Rouge, La., in 1860, and was the son of Rev. Thos. Castleton, a Presbyterian minister of English birth, who was lost in making a voyage to Europe in the ill-fated steamer *Shibboleth*, soon after the close of the war. He received his education at Princeton, N. J., and took the degree of bachelor of arts. He learned the drug business with R. Cotter and graduated from the Philadelphia College of Pharmacy in 1879, his thesis being entitled Percolation with Improved Apparatus. After his graduation he located in the drug business at Galveston, Tex., and subsequently removed to Houston, where he took up the study of medicine and took one course in the Jefferson Medical College, Philadelphia, Pa., and in 1886 graduated as a physician from the University of Vermont, located at Burlington, Vt., and during the course had charge of the Mary Fletcher Hospital. In 1888, he established himself at Houston, Tex., where he built up a lucrative practice. He was a member of the Texas State Medical Association and of the Harris County Medical Society, besides occupying the position of medical examiner for seven insurance companies and as a physician for a number of fraternal orders. He was also connected with the Order of Elks and the Light Guards, a military organization, and served as its surgeon for a long time. He was highly esteemed for his ability as a physician and as an enterprising citizen.

William Henry Schively, one of the oldest importers in the city, died at his residence in Germantown, on Thursday morning, of heart failure. He was born in this city in 1821, and was a son of Henry Schively, at one time a well-known surgical instrument maker. He was educated at private schools, and graduated in the class of 1842 from the Philadelphia College of Pharmacy, afterwards entering the store of Frederick Brown, at Fifth and Chestnut Streets.

Leaving Brown's, Mr. Schively formed a partnership with Ernest Weiss about 1848, under the firm name of Weiss & Schively, for the importing of drugs, dyes and chemicals, with a warehouse on North Front Street. In 1852, the partnership was dissolved and the business continued by Mr. Schively alone at No. 41 North Front Street. His foreign correspondents included the most prominent of the European drug houses, and, until 1866, when he retired from business permanently, he enjoyed almost a monopoly of some branches of drug and dyestuff importation in this city.

Since his retirement from active business life he lived in Germantown. He was for many years connected with the Second Presbyterian Church of that place, and was a member of its Board of Trustees, besides being Treasurer several years. He was a close student of the natural sciences, and took especial interest in meteorology. Mr. Schively survived his wife, who was a daughter of the late Samuel C. Ford, more than 27 years. He leaves one son, Edwin F. Schively, a member of the Philadelphia Bar.

CLASSES

—OF THE—

PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-THIRD ANNUAL SESSION, 1893-1894.

JUNIOR LIST.

Name.	*Place.*	*State.*	*Preceptor.*
Aikens, James Phil.,	State College,	Pa.	W. S. Glenn, M.D.
Allen, Augustus Duvall,	Philadelphia,	Pa.	A. W. Duvall, M.D.
Allen, Jr., Benjamin B.,	Smyrna,	Del.	C. A. Eckels.
Anderson, Wm. Rufus,	Philadelphia,	Pa.	W. Nelson Stem.
Anewalt, Ellsworth Quincy,	Catasauqua,	Pa.	Smith, Kline & French Co.
Arcularius, Harry Edward,	Washington,	Mo.	E. W. Gallenkamp.
Armstrong, Walter,	Edenburg,	Va.	L. C. Funk.
Armstrong, William Edward,	North Adams,	Mass.	Special Chemistry.
Arndt, Harry,	Manheim,	Pa.	H. F. Ruhl.
Aszman, Louisa Henrietta,	Cumberland,	Md.	H. L. Smith.
Bahn, Edwin Morgan,	York City,	Pa.	H. H. Hay.
Ball, William Ernest,	Hellertown,	Pa.	Ellwood Ball.
Barbiere, Francis Joseph,	Philadelphia,	Pa.	W. R. Warner & Co.
Barnes, Gus. M.,	Chattanooga,	Tenn.	W. H. Barnes.
Barnitz, Harry L.,	Chambersburg,	Pa.	J. L. Barnitz.
Barr, David Ford,	Philadelphia,	Pa.	B. J. Stathem.
Bartholomew, Claude Lafayette,	Bath,	Pa.	Peters & Smith.
Bauer, Edward Julius,	Philadelphia,	Pa.	L. G. Bauer, M.D.
Beavans, William Eugene,	Enfield,	N. C.	P. Fitch, M.D.
Becker, Irwin Atwood,	Avon,	Pa.	Jos. L. Lemberger.
Bell, Joseph Valient,	Philadelphia,	Pa.	D. W. Flemming, M.D.
Bell, R. A.,	Reading,	Pa.	G. W. Winebrenner.
Benford, Jr., George Washington,	Somerset,	Pa.	G. W. Benford.
Bingman, Harry Clayton,	Jersey Shore,	Pa.	J. Frank Gray.
Booth, James Lofton,	Biloxi,	Miss.	R. C. Cadmus.
Booth, William Henry	Danville,	Va.	J. L. Hagan.
Bostock, Herbert Arthur,	Norristown,	Pa.	C. B. Ashton.
Bowman, Bertram,	San Francisco,	Cal.	L. P. Bowers.
Boyd, Roger,	Atlanta,	Ga.	Geo. F. Payne.
Boyer, John Clinton,	Loyalton,	Pa.	H. C. Eddy.
Brendel, Frederick Charles,	Zanesville,	O.	Henry Mueller.
Brockmann, Frank William,	York,	Pa.	Dale Hart & Co.
Brown, Charles Oliver,	Reading,	Pa.	Harry Swain.
Brown, James Lawrese,	Philadelphia,	Pa.	Finnerty, McClure & Co.
Brown, Roscoe James,	Oxford,	Pa.	W. T. J. Brown.
Brunhouse, Frederick,	York,	Pa.	Wm. Smith & Co.
Bryson, Harry Martin,	Ephrata,	Pa.	Frederick Rapp, M.D.
Bundy, Clinton Thomas,	Barnesville,	O.	J. K. Hartman.
Buxton, Thomas Alexander Moore,	Findlay,	O.	S. C. Meredith, M.D.
Caffrey, J. B.,	S. Bethlehem,	Pa.	J. E. McBride.
Cahill, Andrew Aloysius,	Wilmington,	Del.	John Fahey.
Campbell, Andrew,	Williamsport,	Pa.	Duble & Cornell.
Carman, Harry Alfred,	Philadelphia,	Pa.	Shoemaker & Busch.

Name.	*Place.*	*State.*	*Preceptor.*
Carter, Chas. Franklin,	Dayton,	O.	Harry T. Stover.
Cassel, James Wilson Undercufler,	North Wales,	Pa.	Wm. R. Childs.
Chalfant, Charles Joshua,	Philadelphia,	Pa.	E. D. McNair & Bro.
Clark, Robert,	Union City,	Ind.	J. P. Frey.
Collins, Harry Thomas,	New York,	N. Y.	Wm. Wilson.
Conger, Horace Glenn,	Manchester,	Ia.	E. J. Conger.
Cope, Edward Kreidler,	Philadelphia,	Pa.	F. H. Cope.
Coppenhaver, Charles Brewster,	Campbelltown,	Pa.	Jonas H. Garman.
Cornell, Horace Hogeland,	Philadelphia,	Pa.	Robert Glenk.
Cornfield, Abraham,	Berlin,	Ger.	H. S. Rhoads, M.D.
Costen, Wm. Adams,	Pocomoke City,	Md.	W. H. Gano.
Cowdery, Martin Franklin,	Philadelphia,	Pa.	
Craig, Ralph Butz,	Allentown,	Pa.	Kennedy & Burke.
Crawford, John Yocum,	Bryn Mawr,	Pa.	A. W. Wright & Co.
Davies, William Richard,	Wilkes-Barre,	Pa.	F. H. Moore, M.D.
Davis, Robert Goode,	Hot Springs,	Ark.	B. W. Goode.
Dean, Guy Stewart,	Kenton,	O.	W. D. Dean.
Deen, Geo. F.,			
DeGraffe, Bertha Leon,	New York,	N. Y.	
DeLorme, John Grenville,	Sumter,	S. C.	J. F. W. DeLorme.
Denton, Robert Ainsworth,	Manchester,	Ia.	Henry C. Smith.
Deibert, Wm. Henry,	Northampton,	Pa.	J. H. Stermer.
Dewees, Wm. Holstein,	Kennedyville,	Md.	Finnerty, McClure & Co.
Dietrich, Pierce Abbott,	Kutztown,	Pa.	M. H. Bickley.
Dill, Benjamin,	Milton,	Del.	W. E. Lee.
Diller, Ira,	Wilmington,	Del.	J. M. Griffen.
Draper, Oscar Carman,	Wilmington,	Del.	W. C. Taylor.
Dudney, Jr., Mansel White,	St. Louis,	Mo.	R. S. Overstreet.
Durand, Arthur John,	Beverly,	N. J.	E. S. Adams, M.D.
Durbin, John George,	Plymouth,	Pa.	R. D. Williams.
Eddy, Volora Doolittle,	Chester,	Pa.	A. L. Castle.
Eldred, Jarvis Harry,	Mahaffey,	Pa.	Dr. Murray.
Fagley, Roscoe Conkling,	Mount Carmel,	Pa.	Dr. E. S. Heiser & Co.
Farley, Levy James,	Chester,	Pa.	W. H. Farley.
Farrell, Martin Edward,	Centralia,	Pa.	W. H. Reed.
Felker, Harry,	S. Bethlehem,	Pa.	W. B. Gleim.
Few, Colin Spangler,	Middletown,	Pa.	C. E. Pease, M.D.
Field, Benjamin Franklin,	Denton,	Md.	W. H. Hobson.
Fitzgerald, Walter Samuel,	Philadelphia,	Pa.	E. R. Gatchel.
Flitcraft, Warren Whitney,	Woodstown,	N. J.	G. M. Andrews.
Foresman, Harry Bastian,	Williamsport,	Pa.	J. Paul Suess.
Foster, William Newell,	Philadelpnia,	Pa.	Wm. H. Sauer.
Freethy, Charles Henry,	Hawley,	Pa.	H. A. Plum.
Froendhoff, Chas. Joseph,	Dayton,	O.	J. W. Muller.
Gamble, Theodore Littlefield,	Philadelphia.	Pa.	Special Chemistry.
Gillette, Frank A.,	Connecticut.		Special Chemistry.
Goodenough, Harry Davis,	Trenton,	N. J.	Chas. P. Britton.
Grasser, Edward John,	Toledo,	O.	Special Chemistry.
Greenawalt, David Lehman,	Chambersburg,	Pa.	W. G. Greenawalt.
Griesemer, James Adam,	Bernville,	Pa.	Chas. Rentschler, Jr.
Griswold, Charles Moss,	Harrisburg,	Pa.	A. Gerhard.
Grotz, Milton,	Bethlehem,	Pa.	John Horning.
Grumbine, Thaddeus Stevens,	Lebanon,	Pa.	Dr. Geo. Ross & Co.
Hahn, Edward Titus,	South Easton,	Pa.	A. N. Richards.
Haig, Jr., Charles Roberts,	Philadelphia,	Pa.	Chas. R. Haig.
Haines, Charles Henry,	Rising Sun,	Md.	L. R. Kirk, M.D.
Haines, Samuel Woolston,	Camden,	N. J.	E. W. Collins.
Hall, Robert Carson,	Kane,	Pa.	Chas. Leedom.
Hamilton, Walter Scott,	Roseburg,	Or.	S. Hamilton.

Name.	*Place.*	*State.*	*Preceptor.*
Hamilton, William Hamsher,	Shippensburg,	Pa.	J. C. Altick & Co.
Harbaugh, George Edward,	Waynesboro,	Pa.	Geo. F. Shively, M.D.
Harlow, Charles Mills,	Nova Scotia.		J. C. Coltman.
Harrell, Herbert Dean,	Wheeling,	W. Va.	G. H. Ebeling.
Hauck, John Francis,	Philadelphia,	Pa.	E. F. Kessler.
Haymaker, Milo Miller,	Warrensburg,	Mo.	H. L. Barber.
Heffernan, Joseph Aloysius,	Wilkes-Barre,	Pa.	E. S. Robins.
Hellyer, Edwin Fayette,	Penns Park,	Pa.	Howard A. Hellyer, M. D.
Henderson, Fred. Benton,	Brookville,	Pa.	C. B. Henderson.
Hendrickson, William Randolph,	Swedesboro,	N. J.	H. E. Jones.
Herberveaux, Jules,	Utica,	N. Y.	John H. Sheehan & Co.
Herbst, Fred. J.,	Germany,		August Hohl.
Hering, Edwin Arney,	Altoona,	Pa.	G. W. Kessler.
Hetriche, Clodia,	Putneyville,	Pa.	Women's Hospital.
Hetrick, Annie Louisa,	Wellsville,	Pa.	Dr. A. C. Hetrick & Son.
Heyser, Jonas Edward,	Philadelphia,	Pa.	James Forgy.
Heysham, Horace B.,	Norristown,	Pa.	W. H. Campbell.
Hill, W. Maurice,	Lansford,	Pa.	J. L. Curry.
Hodge, William Roseborough,	Columbia,	Tenn.	Wooldridge, Irvine & Towler.
Holliday, John Thomas,	Philadelphia,	Pa.	H. Diefenbach.
Holshue, Charles Raymond,	Shamokin,	Pa.	Dr. Clark.
Hopkins, John Lake,	Philadelphia,	Pa.	Powers & Weightman.
Horst, Harry Lewis,	Loch Haven,	Pa.	T. C. Hilton & Co.
Hostelley, Joseph,	Philadelphia,	Pa.	T. W. Hargraves.
Howard, John Edgar,	Harrisburg,	Pa.	F. M. Roe & Son.
Howe, Herrman North,	Mifflintown,	Pa.	L. Banks & Co.
Huber, Solomon Riss,	Chambersburg,	Pa.	G. H. Ischler, M.D.
Hummell, David Fox,	Hummellstown,	Pa.	J. L. Patterson.
Humpton, Albert Norton,	Parkersburg,	Pa.	H. G. Kalmbach.
Hundertmark, John Charles,	Cleveland,	O.	Acker Brothers.
Hyers, Percy,	Dayton,	O.	Adolph Latin.
Ireland, William Page,	Mt. Holly,	N. J.	Edward B. Jones.
Jackson, Robert MacGregor,	New Glasgow,	N. S.	C. A. Eckels.
Jackson, William S.,			
Jaeger, Charles Frederick,	North Adams,	Mass.	E. E. Bostick.
Johnson, Albert Burtis,	Point Pleasant,	N. J.	J. H. Munson.
Jones, Charles Liston,	Harrington,	Del.	J. B. Moore.
Jones, John Comer,	Millville,	N. J.	Dr. C. B. Neal & Co.
Jones, Thomas Morgan,	Shamokin,	Pa.	T. F. Simmonds.
Jordan, Ross,	Franklin,	Pa.	
Kalkman, Henry Alfred,	Honesdale,	Pa.	J. T. Brady.
Keagy, Edwin J. Warner,	Altoona,	Pa.	Wm. C. Craine.
Kelley, Alfred Logan,	Wilmington,	Del.	Garrett S. Smith.
Kelly, Francis Patrick,	Carbondale,	Pa.	B. A. Kelly.
Kellner, Harry Chas. Fred.,	Philadelphia,	Pa.	Samuel Gerhard.
Kercher, Edwin Harry,	Kutztown,	Pa.	J. L. D. Morison, M.D.
King, Albert Joseph,	Allenville,	Pa.	Turner & Kantner.
Kline, Frank,	Reading,	Pa.	Frank Morse.
Kline, Harry Herbert,	Reading,	Pa.	Chas. Shivers.
Knauer, August,	Philadelphia,	Pa.	Fredk. Romberg.
Konover, Harold Doble,	Trenton,	N. J.	D. W. Baker.
Krauth, Harry Earl,	Cleveland,	O.	Elmer Krauth.
Kunkle, Timothy Oscar,	Williamsport,	Pa.	W. E. Kunkle.
Labbe, Edward Blaise,	Portland,	Or.	Laue & Davis.
Lachenmayer, Henry J.,	Philadelphia,	Pa.	Robt. Shoemaker & Co.
Lake, John Fox,	Shenandoah,	Pa.	Jay & Murphy.
Lambert, Herbert Grayson,	Waynesboro.	Va.	Henry C. Blair.
Lancaster, Brenton Solomon,	Forksville,	Pa.	W. F. Randall, M.D.
Lanius, Ross McDonald,	Stewartstown,	Pa.	C. Lutzinger.

Name.	*Place.*	*State.*	*Preceptor.*
LaRue, Willis Leslie,	Dillsburg,	Pa.	H. A. Borell.
Lau, Scott Wolford,	Dillsburg,	Pa.	Frank E. Morgan.
Lauer, Emanuel Hiram,	Eugene,	Or.	T. J. Craig.
Lautenbacher, William Roth,	Tamaqua,	Pa.	I. L. Lautenbacher.
Lawton, Henry Cuthbert,	Halifax,	N. S.	Campbell & Bro.
Lee, Henry Francis,	Port Kennedy,	Pa.	Funk & Groff.
Leech, David Malcolm,	Philadelphia,	Pa.	Geo. Freshell.
Levi, Plus Nayes Raud,	Charleston,	W. Va.	J. H. Marity.
Lewis, Arthur Rimmer,	Mexia,	Tex.	R. L. Long, M.D.
Lewis, Jos. Smyser,	York,	Pa.	J. N. G. Long & Co.
Lloyd, Ephraim Augustus,	Wilmington,	Del.	S. C. McKeever.
Long, Harvey,	Middleton,	Pa.	W. A. Burns, M.D.
Lord, John Edward,	Upland,	Pa.	J. F. Judge.
Loveland, Prescott Raymond,	Vincentown,	N. J.	Benjamin Kent.
Luburg, Leon Franklin,	Philadelphia,	Pa.	B. L. Brown, M.D.
Mainhart, Jacob Michael,	Frederick,	Md.	Dr. Hughes.
Malsbury, Hillman Gaskill,	Mt. Holly,	N. J.	R. C. Barrington.
Marwood, Albert Victor,	Camden,	N. J.	Wm. Shafer, M.D.
Mathews, William Joseph,	St. Clair,	Pa.	Jesse W. Pechin.
Matthews, Charles Morgan,	Bridesburg,	Pa.	David Dalton.
Matusow, Harry,	Russia,	Europe,	A. C. Wickham.
Mayberry, Edwin Daniel,	Allentown,	Pa.	G. W. Shoemaker.
Mayhew, Charles Holmes,	Bridgeton,	N. J.	Wm. Brewer.
McCanna, John Milton,	Columbia,	Pa.	G. V. Eddy.
McClosky, Wilson Cathcart,	Curwensville,	Pa.	Jos. R. Irwin.
McConnaughy, John Frank,	Bridgeport,	O.	J. O. Howells.
McFadden, Thomas Francis,	Gruley Centre,	Neb.	J. J. McFadden, M.D.
McGhee, Saylor John,	Beech Creek,	Pa.	W. L. Turner & Son.
McMillan, Edwin Harbaugh,	Accident,	Md.	A. F. Speicher.
McNair, William Righter,	Hazleton,	Pa.	McNair & Hoagland.
McNeil, Thomas Hunter,	Philadelphia,	Pa.	R. C. McNeil.
MacPhee, Thomas Duncan,	New Glasgow,	N. S.	C. A. Eckels.
Meredith, Charles Howard,	Media,	Pa.	W. E. Dickeson.
Miller, Bert Leroy,	Liberty,	Pa.	W. A. Musson.
Miller, James Peter,	Ottawa,	Kan.	C. L. Becker & Co.
Moore, George Cooper,	Felton,	Del.	J. V. Slaughter.
Moosbrugger, Charles Otto,	Dayton,	O.	Geo. Latin.
Morgan, Clayton Edward,	Philadelphia,	Pa.	Frank E. Morgan.
Morris, Max,	Atlanta,	Ga.	John Ingalls.
Mosebach, Ferdinand Adam,	Bethlehem,	Pa.	H. A. Burkhart, M.D.
Musselman, Morris Myers,	Fairfield,	Pa.	J. M. Stoever.
Myers, John Henry,	Mechanicsburg,	Pa.	Robert P. Long.
Myers, Wm. Henry,	Marietta,	Pa.	Philip A. Pyle.
Naly, Sarah Lusan,	Mt. Pleasant,	Pa.	Susan Hayhurst, M.D.
Neely, Horace Shively,	Fairfield,	Pa.	J. M. Griffin.
Nickum, James Weller,	Salt Lake City,	Utah.	J. O. Lisle, M.D.
Nicodemus, Edwin Arthur,	Harrisburg,	Pa.	C. P. Hendrickson.
Nolte, Harry Ruhl,	Swedesboro,	N. J.	C. Petzelt.
Notley, Wm. Toade,	Port Deposit,	Md.	A. C. Wickham.
Parke, John Siter,	Philadelphia,	Pa.	Chas. H. Tatem.
Parker, Howard Eugene,	Wallingford,	Conn.	A. B. Pixley.
Peil, George William,	Honesdale,	Pa.	Jadwin & Spencer.
Pellett, Edmond Burnham,	Scranton,	Pa.	R. W. Cuthbert.
Pennington, George Murat,	Stanardsville,	Va.	L. K. Slifer.
Peterson, Carl Louis,	Philadelphia,	Pa.	
Pierson, Alfred M.,	Vineland,	N. J.	Bidwell & Co.
Place, Charles Ross,	Stroudsburg.	Pa.	J. M. Kerr.
Poole, Henry Harrison Higbee,	Bristol,	Pa.	J. E. Wright.
Porter, John Morris,	Philadelphia,	Pa.	Francis S. Hughes.

Name.	*Place.*	*State.*	*Preceptor.*
Porter, Wm. Edgar,	Meadville,	Pa.	F. K. Easterwood.
Powell, Charles Deitz,	Coatesville,	Pa.	Wm. C. Thompson.
Punt, Arnold Anthony Joseph,	Philadelphia,	Pa.	W. H. Pile & Sons.
Quatman, John Henry,	Philadelphia,	Pa.	C. A. Werckshagen.
Quine, John Henry,	Rochester,	N. Y.	Special Chemistry.
Rabenau, Arwed Gustav,	Dresden,	Saxony,	John R. Angney, M.D.
Raum, Shelton B.,	Shippensburg,	Pa.	J. C. Altick & Co.
Read, Joseph,	Fernandina,	Fla.	J. Barcley Hall.
Reich, Sol. Mittler,	Wheeling,	W. Va.	Ed. Bocking.
Reinert, Casper,	Sigourney,	Ia.	B. Franken & Son.
Ricker, Wm. Horner,	Hummelstown,	Pa.	C. R. Myers.
Richman, Edward Milton,	Deerfield,	N. J.	Geo. B. Evans.
Ridgway, Wm. Frederick,	Seattle,	Wash.	G. O. Guy.
Ritchey, Charles Howard,	Everett,	Pa.	C. G. Masters.
Ritter, Frederick William,	Middleport,	Pa.	Thos. M. Newbold.
Robinson, Raleigh,	Hatboro,	Pa.	W. T. Robinson, M.D.
Rochelle, Harry Birch,	Philadelphia,	Pa.	W. A. Rumsey.
Rox, James Francis,	West Chester,	Pa.	W. A. Pierce.
Rudy, Harry Robert,	Hagerstown,	Md.	D. C. Aughinbaugh & Son.
Rupp, Herbert Vincent,	Carlisle,	Pa.	V. H. Ritchey.
Rutherford, John Borton,	Philadelphia,	Pa.	C. A. Rutherford.
Rutter, Thomas Chichester,	Williamsport,	Pa.	C. H. Clark.
Sager, Verner Edward,	N. Bristol,	O.	Andrew Blair.
Saltzer, James Albert,	Sacramento,	Pa.	H. J. Batdorff.
Sames, Joseph Howard,	S. Bethlehem,	Pa.	Simon Rau & Co.
Sanders, Joseph Oliver,	Mifflinburg,	Pa.	T. E. Hickman.
Schabinger, Charles,	Felton,	Del.	Wm. Harris.
Schaeffer, Otis Oliver,	Middletown,	Pa.	J. W. Rewalt.
Schmitt, Albert Herman,	Los Angeles,	Cal.	C. H. Tatem.
Schrack, Robert Franklin,	Philadelphia,	Pa.	W. S. Young.
Scott, Thornton Ford Brainard,	Philadelphia,	Pa.	J. R. Smyser.
Seaman, Harvey Willard,	Massillon,	O.	F. E. Seaman.
Seiple, Harry Bertram,	Philadelphia,	Pa.	Leidy Seiple.
Semple, Jr., Henry Beidleman,	Easton,	Pa.	H. B. Semple & Son.
Sharp, Warren Reed,	West Chester,	Pa.	A. B. Hammond.
Shenk, John Benjamin,	Derry Church,	Pa.	W. G. Toplis.
Shisler, Edwin Ira,	Girard Homestead,	Pa.	James G. Wells.
Shoemaker, Clinton Llewellyn,	Allentown,	Pa.	F. Seitz, M.D.
Sisler, Loerey William,	Bridgeport,	Pa.	F. P. Rutherford.
Skay, Edward Joseph,	Philadelphia,	Pa.	Special Chemistry.
Skinner, Harry Wharton,	Chambersburg,	Pa.	Cressler & Keefer.
Smith, Anson Hungerford,	Mansfield,	O.	
Smith, Rodney,	Saegerstown,	Pa.	S. S. Collem.
Snyder, Benjamin Crawford,	Philadelphia.	Pa.	Decatur Milligan.
Spangler, Nelson Penrod,	Yeagertown,	Pa.	John C. Innes.
Spidel, Frank Myers,	Bedford,	Pa.	D. H. Ross.
Spotts, Allie Oyster,	Newport,	Pa.	A. C. Schofield.
Stahel, Albert William,	Boscabel,	Wis.	H. B. Morse.
Stahl, Joseph Bowers,	Philadelphia,	Pa.	Standard Pharmacy Co.
Stanton, John Emmet,	Swatara,	Pa.	H. T. Rhoads, M.D.
Steiner, Stewart Banks,	S. Easton,	Pa.	Allen Spengler.
Stephen, Annie Rex,	Reading,	Pa.	W. L. Stephen.
Stern, Wilson Clinton Ammon,	S. Bethlehem,	Pa.	D. Bruce Richards.
Stineman, Jacob John,	Philadelphia,	Pa.	W. H. Sutton.
Stoner, Mrs. Margaret W.,	Norristown,	Pa.	Dr. Alice Bennett.
Stoker, Walter Wilkins,	Philadelphia,	Pa.	Powers & Weightman.
Stout, Edward Clayton,	Philadelphia,	Pa.	G. C. Devine, M.D.
Streeper, Austin,	Norristown,	Pa.	Harry R. Stallman.
Strickler, Jr., George,	Lebanon,	Pa.	S. H. McGowan.

Name.	*Place.*	*State.*	*Preceptor.*
Stuart, R. C.,	Houston,	Tex.	Geo. W. Heyer.
Swartz, Calvin,	Wilmington.	Del.	J. S. Beetem.
Tall, Jr., Thomas Anthony,	Chester,	Pa.	Jno. F. Fielding.
Tarr, Robert H.,	Cleveland,	O.	M. G. Tielke.
Taylor, George Fred.,	Philadelphia,	Pa.	Thomas Craighead.
Test, Ellwood Allen,	Philadelphia,	Pa.	J. H. Kerr.
Thayer, Guy Parker,	Garrettsville,	O.	E. J. Morris.
Thompson, Alexander Peterson,	Philadelphia,	Pa.	W. L. Cliffe.
Thompson. Nathan Lincoln,	St. Johnsbury,	Vt.	C. C. Bingham.
Thornton, Thomas Redman,	Union Point,	Ga.	E. F. Kessler.
Thrush, Morris Clayton,	Charlestown,	W. Va.	Light & Watson.
Tinsman, Edward Walker,	Williamsport,	Pa.	J. Miles Yost.
Toelker, Charles,	Philadelphia,	Pa.	F. E. Morgan.
Troxell, John Isaac Peter,	Allentown,	Pa.	H. G. Haring.
Urich, Mark Spangler,	Myerstown,	Pa.	W. C. Kline.
VanZandt, Charles Howard,	Philadelphia,	Pa.	Herbert J. Smith.
Vernon, Harold Gilmour,	Clifton Heights,	Pa.	Geo. R. Vernon, M.D.
Vickers, Harry Martin,	Frankford,	Del.	Layton & Layton.
Waters, Thomas Carey,	Stroudsburg,	Pa.	Jno. S. Brown.
Watson, Walter Wilmer,	Lancaster,	Pa.	Wm. Harris.
Wayne, Edward Fisher,	Philadelphia,	Pa.	Special Chemistry.
Weaver, Wilmer John,	Strasburg,	Pa.	D. G. E. Musselman.
Webbert, Harry Segler,	Mechanicsburg,	Pa.	Eberle Bros.
Weise, Carl E.,	Nashville,	Tenn.	Montg. Bell. Acad.
Wellinsick, Harry William,	York,	Pa.	Howard S. Eckels.
Welsh, Robert Emmett,	Altoona,	Pa.	G. A. Weston.
Wenner, Harvey Eugene,	Philadelphia,	Pa.	James P. Mallon.
West, Morris Fussell,	Kimbleville,	Pa.	F. B. West.
Wetzel, Jr., Samuel,	Carlisle,	Pa.	W. F. Horn.
Whitacre, Lewis Reece,	Mt. Holly,	N. J.	Elmer D. Prickett.
Whiteley, Edward Albert,	New Hope,	Pa.	Geo. M. Shamalia.
Whitely, John Campbell,	Goderich,	Can.	W. C. Goode.
Wiegner, Charles William,	Slatington,	Pa	J. A. Wiegner.
Williamson, Thomas McGill,	Frederick,	Md.	J. A. Williamson.
Winger, David Zwingle,	Mechanicstown,	Md.	J. K. Waters, M.D.
Winger, John Bowman,	Norristown,	Pa.	O. F. Lenhardt.
Wismer, Isaac Gross,	Philadelphia,	Pa.	Edw. T. Spencer.
Wissman, Herman Bayard,	Philadelphia,	Pa.	H. T. Hayhurst.
Woolley, Washington Irving,	Ocean Grove,	N. J.	Stephen D. Woolley.
Wyatt, John Congle,	Portland,	Or.	O. P. S. Plummer. M.D.
Young, George,	Johnstown,	Pa.	Chas. Young.
Young, Horace Greely,	Bristol,	Pa.	J. K. Young.
Young, Warren Ray,	Lykens,	Pa.	A. G. Stanley.
Ziegler, John Clayton,	York,	Pa.	B. S. Gilbert.
Zipp, Charles James,	Utica,	N. Y.	C. H. Jones.
Zook, John Noah,	Coatesville,	Pa.	Geo. W. Davy.

SENIOR LIST.

Adams, Bentley Bryant,	Atlantic City,	N. J.	L. C. McClellan.
Aley, Hamilton,	New York,	N. Y.	W. S. Rockey.
Alsop, Jno. Warburton,	Tremont,	Pa.	G. P. Scheehle.
Alter, George Merchant,	Blairsville,	Pa.	H. S. Bossart, M. D.
Armstrong, Eugene Curtis,	Odessa,	Del.	E. C. Armstrong.
Atkins, Frank Hean,	Lebanon,	Pa.	James T. Shinn.
Aughinbaugh, Wm. Culbertson,	Hagerstown,	Md.	D. C. Aughinbaugh & Son.

Name.	*Place.*	*State.*	*Preceptor.*
Bacon, Edwin Gray,	Freehold,	N. J.	Chas. A. Bye
Baer, Howard W.,	Philadelphia,	Pa.	W. H. Llewellyn.
Bailey, John,	Dover,	Del.	L. A. Treichler.
Bailey, John Henry,	S. Bethlehem,	Pa.	George Freshell.
Baker, George Fisher,	Philadelphia,	Pa.	C. A. Baker, M.D.
Barlow, Walter Gilbert,	Philadelphia,	Pa.	Louis E. Barlow.
Barr, Elwyn Paul,	Pine Grove,	Pa.	C. D. Früh, M.D.
Barr, Robert Hamilton,	Philadelphia,	Pa.	Jos. McKee.
Bauch, George Franklin,	Cleveland,	O.	E. A. Schellentrager.
Beakey, George Bernard,	Philadelphia,	Pa.	H. B. Morse.
Beavers, Frank Washington,	Scranton,	Pa.	G. W. Jenkins.
Bertsch, George Philip,	Sigourney,	Ia.	T. T. Blaise, M.D.
Betz, Wm. Howard,	Philadelphia,	Pa.	J. A. Buckman.
Binkley, Harry Jonathan,	Reading,	Pa.	W. T. Potteiger.
Binns, Harry R.,	Germantown,	Pa.	B. A. Wissler.
Black, Charles Jeffries,	Chambersburg,	Pa.	Cressler & Keefer.
Blackmer, Fred. Holland,	Ithaca,	N. Y.	J. B. Todd.
Blair, Charles Lee,	Harrisburg,	Pa.	J. Wilson Hoffa.
Blumhard, Jr., Charles Albert,	Pine Bluff,	Ark.	J. O. Smith.
Bole, Robert,	Philadelphia,	Pa.	John B. Reynolds.
Bolton, Alfred Harrison,	Philadelphia,	Pa.	A. H. Bolton, Ph.G.
Bowen, Willis E.,	Churchville,	N. Y.	James H. Bushnell.
Brallier, Stanley, A. E.,	Indiana,	Pa.	Thos. M. Newbold.
Brandt, Harvey Eshelman,	Marietta,	Pa.	I. S. Schmehl.
Branin, Frederick Winston,	Medford,	N. J.	H. P. Thorn.
Brellocks, Frederick John,	Philadelphia,	Pa.	M. A. Hull.
Bremer, Albert Herman,	Philadelphia,	Pa.	Max Sonntag.
Brennan, Francis Henry,	Philadelphia,	Pa.	H. N. Brennan.
Britcher, Milton Weimer,	Dillsburg,	Pa.	H. W. Fishel, M.D.
Brooks, Joseph Warren,	Pensauken,	N. J.	Bullock & Crenshaw.
Brown, Daniel Edward,	Zanesville,	O.	The Bailey Drug Co.
Brown, Gorden Sweatland,	S. Bethlehem,	Pa.	G. W. Rowland.
Brown, James Reed Logan,	Greensburg,	Pa.	S. P. Brown.
Brown, Wilbur Beers,	Jersey Shore,	Pa.	B. E. Staples.
Brunier, George Franklin,	Philadelphia,	Pa.	Chas. Bohn.
Bucher, Wm. Lewis,	Columbia,	Pa.	W. M. Borden.
Bunting, Frank Allison,	Norristown,	Pa.	Wm. Stahler.
Bush, Harvey Benjamin,	Bethlehem,	Pa.	C. B. Lowe, M.D.
Butz, Newton,	Wescosville,	Pa.	Aug. Weber.
Cain, Maud Florence,	Lancaster,	Pa.	Chas. A. Heinitsh.
Cameron, Frank Butler,	Smyrna,	Del.	H. C. Blair's Sons.
Campbell, Joseph,	Chestnut Hill,	Pa.	W. A. Whittem.
Campbell, Robert,	Belfast,	Ireland,	J. F. Meade, M.D.
Campbell, Thomas Palmer,	Philadelphia,	Pa.	Funk & Groff.
Cappeau, Thomas Harrison,	Wilmington,	Del.	N. B. Danforth.
Casey, John Francis,	Philadelphia,	Pa.	Smith, Kline & French Co.
Cavanaugh, Charles Joseph,	Clifton,	Pa.	H. E. Swartley, M.D.
Chatham, John E.,	Chester,	Pa.	W. C. Kelly.
Christ, George Raymond,	Pine Grove,	Pa.	Geo. W. Schools.
Clair, Joseph Sylvester,	Camden,	N. J.	Wm. P. Weiser.
Claudy, Robert Blean,	Newville,	Pa.	B. F. Emrick, M.D.
Coffey, Maurice Grant,	Lock Haven,	Pa.	Geo. W. Mason.
Conard, Norman Shoemaker,	Philadelphia,	Pa.	T. E. Conard, M.D.
Craig, Harvey Alfred,	Galesburg,	Ill.	
Culley, John,	Ogden,	Utah,	J. J. Driver.
Dare, Charles Wilfred,	Bridgeton,	N. J.	Charles F. Dare.
Daws, Wm. R.,	Scranton,	Pa.	Rea & Jones.
Deen, Frank Snyder,	Lancaster,	Pa.	Chas. E. Long.
Desmond, Edward,	Buffalo,	Wy.	Frank H. Eggleston.

Name.	*Place.*	*State.*	*Preceptor.*
Dilks, Jr., Harmon,	Bridgeton,	N. J.	Geo. H. Whipple.
Dougherty, Albert,	Wilmington,	Del.	J. M. Harvey.
Douglass, Wm. Tyler,	Harrisburg,	Pa.	T. A. Thorley.
Draper, Oscar Carman,	Wilmington,	Del.	W. C. Taylor.
Dunn, Edward Walker,	Salem,	N. J.	W. Henry Dunn.
Durham, John McCurdy,	Reading,	Pa.	Albert R. Durham.
Eakin, Henry Gray,	Springtown,	Pa.	Chas. A. Eckels.
Ellis, David,	Philadelphia,	Pa.	W. S. Froelich.
Ely, Frank W.,	Williamsport,	Pa.	J. Miles Yost.
Engle, Stratton R.,	Glendale,	N. J.	J. H. Davis.
Eyer, Edward Augustus,	Bloomsburg,	Pa.	Meyer Bros.
Fackenthall, John Michael,	Springtown,	Pa.	M. M. Buss.
Faries, Wm. Edwin,	Smyrna,	Del.	Lawson C. Funk.
Farrow, Charles Taylor,	Philadelphia,	Pa.	T. C. Tomlinson.
Faunce, Jr., Benjamin Rice,	Philadelphia,	Pa.	Q. H. L. Faunce.
Faust, Peter,	Scranton,	Pa.	Carl Lorenz.
Fishburne, Pliny,	Waynesboro,	Va.	Fishburne & Co.
Fisher, Edward Keim,	Lititz,	Pa.	E. B. Kyle.
Flanagan, Thomas Francis,	Mahanoy City,	Pa.	A. A. Weber.
Fluck, Charles Lewis,	Allentown,	Pa.	Peter & Smith.
Fowler, Hudson DeMott,	Sandusky,	O.	Henry Muller, M.D.
Furnell, Carl Bennwet,	Wilton,	Me.	A. W. Pottle.
Gabrio, Frank Peter,	Hazleton,	Pa.	McNair & Hoagland.
Garcia, Juan Reyes,	Porto Rico,	W. Indies,	Ramon C. Martin.
Garver, Walter Joseph,	Hagerstown,	Md.	J. L. Kooker.
Gebhardt, Ehrgott William,	Philadelphia,	Pa.	E. F. Bachman, M.D.
Geety, Wallace Gillespie,	Harrisburg,	Pa.	Forney & Knouse.
Genther, Frederick Edwin,	Philadelphia,	Pa.	E. H. Fienhold.
Gerlach, Herman,	Milwaukee,	Wis.	Wm. A. Goes.
Gillespie, Wallace Gault,	Philadelphia,	Pa.	Bullock & Crenshaw.
Goico, Ernest,	Porto Rico,	W. Indies,	C. J. Monagas.
Gorman, Patrick Jones,	South Bethlehem,	Pa.	S. C. R. Hassinger.
Gould, Josiah Cole,	Easton,	Pa.	F. S. Mebers.
Gregory, Robert N.,	Quincy,	Fla.	Drs. Munroe & Scott.
Gunn, Frank,	Philadelphia,	Pa.	T. H. B. Amick, M.D.
Haas, Frederick William,	Nazareth,	Pa.	F. E. Hummelwright, M.D.
Haenchen, Emil Frank,	Philadelphia,	Pa.	C. E. Haenchen.
Hamilton, Charles Ernest,	New Lisbon,	O.	M. N. Hamilton.
Haney, Mary Augusta,	Eastport,	Me.	Dr. Grady.
Harrold, Wm. Henry,			J. M. Bradford, M.D.
Hart, Joseph Aloysius,	Philadelphia,	Pa.	D. S. Jones.
Hatton, Thomas Mifflin,	West Chester,	Pa.	G. B. Evans.
Hayman, Walter,	Turbotville,	Pa.	Dr. Chas. LaShelle.
Heine, Edward Daniel,	Natchez,	Miss.	R. W. Jones.
Helm, Robert Procter,	Philadelphia,	Pa.	Nolte & Reimann.
Hendee, Ulyses Grant,	Jamestown,	N. Y.	Hatch & Briggs.
Henderson, Robert Guy,	Corinth,	Miss.	R. Henderson.
Herbert, Thomas Lewis,	Philadelphia,	Pa.	Wm. Hummell.
Herbst, Fred. John,	Honesdale,	Pa.	R. D. Reed.
Herrmann, Wm.,	Middleport,	Pa.	Albert Cable.
Hess, Miles Roscoe,	Hellertown,	Pa.	M. S. Apple.
Hightower, George Almer,	Arcadia,	La.	W. M. Baker.
Hodgson, Edwin,	Norfolk,	Va.	W. A. S. Taylor.
Hodil, James J.,	Sligo,	Pa.	A. L. Beck.
Hollopeter, Arthur Stadiger,	Shenandoah,	Pa.	F. W. E. Stedem.
Holt, James Stephen,	Philadelphia,	Pa.	J. D. McFerren.
Hoopes, Wilmer Preston,	Hickory,	Md.	Edmond Preston, Jr.
Horting, George Washington,	Ephrata,	Pa.	C. C. Spannagel.
Horton, Arthur Babson,	Boston,	Mass.	John Wyeth & Bro.

Name.	*Place.*	*State.*	*Preceptor.*
Hoskins, John,	Elwyn,	Pa.	Wm. Procter, Jr., Co.
Howell, Edward Vernon,	Rocky Mount,	N. C.	O. B. Keyser.
Howell, Harry Field,	Easton,	Pa.	Geo. B. Evans.
Hubley, John Hiram,	Carlisle,	Pa.	R. P. Marshall.
Huddleson, Frank,	Washington,	D. C.	C. Christiani.
Hughes, Harry Bittenbender,	Shamokin,	Pa.	Barron & Robins.
Hunter, Henry Blount,	Warrenton,	N. C.	F. P. Hunter.
Jackel, J. Otto,	Philadelphia,	Pa.	Geo. D. Jones.
Jackson, Thomas,	Philadelphia,	Pa.	J. F. Ross.
Jacoby, Wm. Lawless,	Philadelphia,	Pa.	Bullock & Crenshaw.
Janisch, Wm.	Phliadelphia,	Pa.	F. H. Davis.
Jennings, Jos.	Moosic,	Pa.	J. E. Lehman.
Jones, Henry Abner,	Lansford,	Pa.	Kennedy & Burke.
Jones, Lester David,	Manchester,	Ia.	Wm. Proctor, Jr., & Co.
Jones, William Willets,	Williamsport,	Pa.	Duble & Cornell.
Jordan, Calvin,	Ritchie C. H.,	W. Va.	W. S. Hamilton.
Kachline, Frederick William,	Easton,	Pa.	Weaver & Solliday.
Kalbach, Charles Peter,	Bernville,	Pa.	P. P. Klopp.
Kalbach, Harry Adam,	Robesonia,	Pa.	R. E. Moyer.
Kappes, George Louis,	Zanesville,	O.	J. R. Johnson.
Kauffman, John Wm.,	Norristown,	Pa.	W. H. Hickman.
Kauffman, Reuben M.,	Chestnut Hil',	Pa.	F. P. Streeper,
Kaye, Emma Louisa,	Philadelphia,	Pa.	John Kaye, M.D.
Keagy, Edwin J. Warner,	Altoona,	Pa.	W. McCraine.
Kelley, John Joseph,	Conshohocken,	Pa.	Robert McNeil.
Kelly, Thomas J.,	Philadelphia,	Pa.	Alva F. Tod.
Ketterer, Martin,	Philadelphia,	Pa.	M. Sontag.
Kinsler, Lemuel Pastorius,	Mt. Airy,	Pa.	Jas. A. Jeffries.
Kirk, Samuel Bird,	Curwensville,	Pa.	Jas. T. Shinn.
Klopp, Lewis Calvin,	N. Heidelberg,	Pa.	S. W. Gadd, M.D.
Kreider, Frank Light,	Philadelphia,	Pa.	L. A. Podolski.
Krumrine, Sidney,	State College,	Pa.	W. S. Glenn.
Kuhn, Edwin Jacob,	Fogelsville,	Pa.	Emlen Martin.
Kyner, Thomas Kennedy,	Orrstown,	Pa.	J. A. Kyner.
LaMaster, Hazen Gillette,	Gardner,	Kan.	A. J. Baumhardt.
Lammer, Henry Bruno,	Philadelphia,	Pa.	F. J. Lammer.
Lanterman, Bartley LaRue,	Blairstown,	N. J.	A. L. Serfass.
Leaman, Davis Hendrix,	Reading,	Pa.	W. M. Koenig.
Leedom, Morris,	Philadelphia,	Pa.	R. P. Wilkinson.
LeFevre, Acton Ash,	Lancaster,	Pa.	M. W. Raub,
Lehman, Joseph David,	Manayunk,	Pa.	L. A. Kelly.
Light, Walter Felix,	Lebanon,	Pa.	A. C. Hersh.
Linn, William Elliott,	Philadelphia,	Pa.	John C. Keys.
Long, Charles H.,	Lebanon,	Pa.	Dr. Geo. Ross & Co.
Long, James Grier,	Coatesville,	Pa.	E. E. Wilson, M.D.
Long, Wm. Wilson,	Lewisburg,	Pa.	Geo. B. Evans.
Lorenz, Charles G.,	Philadelphia,	Pa.	Lawson C. Funk.
Loser, Damian Aloysius,	Lebanon,	Pa.	John F. Loehle.
Loveland, Rowland Wayne,	Mt. Holly,	N. J.	Beach J. Stathem,
Lower, George Graffley,	Philadelphia,	Pa.	W. R. Warner & Co.
Luft, George William,	Salt Lake City,	Utah,	O'Connor & Schaffer.
Lukens, Charles Baker,	Philadelphia,	Pa.	D. A. Over.
Lutz, Walter Preston,	Salem,	N. J.	C. A. Gill & Co.
Lynch, Edmund T.,	Wilmington,	Del.	F. R. Smith, M.D.
Lynn, Wm. Wirt,	S. Bethlehem,	Pa.	C. S. Eldridge, M.D.
MacConomy, Paul Lucien,	Philadelphia,	Pa.	J. H Buckingham.
McCormick, Alexander,	Philadelphia,	Pa.	W. E. Lee.
McCoy, Cornelius Joseph,	Conshohocken,	Pa.	Thos. F. McCoy.
McCracken, Edward Glover,	Philadelphia,	Pa.	J. W. Pechin.

Name.	*Place.*	*State.*	*Preceptor.*
McKee, Francis Town,	Wilmington,	Del.	Jacob S. Beetem.
McNeely, Chas.,	Philadelphia,	Pa.	A. McMullen, M.D.
Mack, James William,	Slatington,	Pa.	J. S. Mack, M.D.
Mackenzie, Edwin Golding,	Wilmington,	Del.	Z. James Belt.
Mader, Elias,	Lebanon,	Pa.	E. H. Gingrich.
Manger, Chas. Christian,	Boonville,	Mo.	W. E. Roeschel.
Martin, John Corson,	Dayton,	O.	C. H. Breidenbach.
Martin, Sam'l E.,	Kennett Square,	Pa.	F. W. Fenn.
Merscher, George Edward,	Philadelphia,	Pa.	J. G. Howard.
Meyers, Henry George,	Bryansville,	Pa.	H. F. Backenstoe.
Meyers, Henry Isaac,	Lanark,	Pa.	W. H. Gano.
Michener, Elmer David,	Duncannon,	Pa.	C. H. Clark.
Miller, Albert Donald,	Cleveland,	O.	C. O. Folkens.
Miller, Albert T.,	Philadelphia,	Pa.	J. T. Shinn.
Miller, Chas. Glanz,	Easton,	Pa.	C. A. Weidemann.
Miller, Harper Gerstley,	South Easton,	Pa.	A. Spengler.
Minton, Henry McKee,	Philadelphia,	Pa.	C. M. Porter.
Missildine, Arthur Huntington,	Winter Park,	Fla.	John Ogden & Co.
Mitchell, Albert Tippet,	Newtown,	Pa.	John Ogden & Co,
Mohr, Frank Martin,	Philadelphia,	Pa.	C. G. A. Loder.
Mooradian, Thos. Mooshake,	Bitlis, Turkey in Asia,		C. G. A. Loder.
Moritz, Birdis Emanuel,	S. Bethlehem,	Pa.	R. H. Lackey.
Moyer, Ralph Rodes,	Roxborough,	Pa.	French, Cave & Co.
Mueller, Charles August,	Philadelphia,	Pa.	Alexander G. Keller.
Murphy, Michael Chas.,	Plymouth,	Pa.	C. Moylan.
Myers, Arnold Armstrong,	York,	Pa.	J. H. Buckingham.
Myers, Henry Joseph,	Philadelphia,	Pa.	J. B. Cook.
Nagle, Clayton Moyer,	Pottstown,	Pa.	Howard G. Shinn.
Nolan, Daniel Andrew,	Pluntsville,	Conn.	Milton Campbell & Bro.
Nugent, Thomas Francis,	Utica,	N. Y.	J. H. Sheehan & Co.
Ohail, Irvin Edwin,	Wooster,	O.	A. W. Blackburn.
Osborne, Albert Edgar,	Wallingford,	Pa.	Wardle Ellis.
Pachali, Jr., Theodore,	Reading,	Pa.	A. T. Pollard & Co.
Parse, John Merritt,	Flemington,	N. J.	J. S. Cooley.
Parvin, Henry Rocap,	Bridgeton,	N. J.	A. S. Elwell.
Pazmino, Francisco,	Machala, Ecuador,	S. A.	H. D. Hermany.
Pennell, Jerome Chester,	Bridgeton,	N. J.	J. L. Supplee.
Peterson, Walter Vickerstoff,	Philadelphia,	Pa.	C. W. Shull.
Phillips, Oscar Wilson,	Caldwell,	O.	W. H. Bowron.
Phillips, Wm. Newton,	Zanesville,	O.	Dr. H. Sunderland.
Pickering, George Wellington,	South Gibson,	Pa.	F. M. Bouton.
Pilgrim, John W.,	Bridgeton,	N. J.	Theo. Campbell.
Porter, Samuel H.,	Pottstown,	Pa.	J. E. Porter, M.D.
Portser, Chas. H.,	Saltsburg,	Pa.	Harry C. Watt.
Price, Harry Dunbavon,	Independence,	Mo.	Frank Price.
Rectenwald, Louis Aloysius,	Pittsburg,	Pa.	Frederick W. E. Stedem.
Reese, Lewis,	Hazleton,	Pa.	Wallace Proctor.
Reeser, Richard,	Mechanicsburg,	Pa.	A. H. Smith, M.D.
Regar, Daniel S.,	Denver,	Pa.	Theo. Doench.
Reifsnyder, David Ernest,	N. Heidelberg,	Pa.	W. E. Donough, M.D.
Rhein, Frank Xavier,	Mansfield,	O.	W. Martin.
Rhoads, Edward Elliott,	Reading,	Pa.	H. M. Muhlenberg.
Richards, Frank Gore,	Hannibal,	Mo.	DeGaris Bros.
Richardson, Arthur Norris,	Portland,	Ind.	Frank Barstow.
Ridenour, William Edward,	Springfield,	O.	J. D. Lisle.
Robbins, George Delbert,	Evansville,	Ind.,	W. A. Lowenthal.
Rock, P. J.,	Sutton,	Neb.	P. Niskey.
Roessner, Frank George,	Philadelphia,	Pa.	Chr. Weiss.
Rogers, George Rowland,	Carbondale,	Pa.	C. M. Driggs.

Name.	*Place.*	*State.*	*Preceptor.*
Rogers, John Wilson,	Independence,	Mo.	Chas. J. Gebauer.
Roseman, Charles Edward,	Massillon,	O.	E. S. Craig.
Rossman, George Albert,	Chambersburg,	Pa.	J. H. Stermer.
Rothrock, Harry George,	Bethlehem,	Pa.	VanBuskirk & Apple.
Rothwell, Walter,	Hatboro,	Pa.	Jno. W. Frey.
Russell, Benjamin Alden,	Ilion,	N. Y.	Ogden & Downs.
Sage, Thomas,	Elmira,	N. Y.	Bullock & Crenshaw.
Sallade, Raymond Ellwood,	Womelsdorf,	Pa.	Frank T. Landis.
Sams, James,	Warrensburg,	Mo.	J. D. Eads & Co.
Saybolt, George Henry,	Philadelphia,	Pa.	W. E. Supplee & Bro.
Schearer, P. Weaver H.,	Reading,	Pa.	A. Schaich.
Schmalzriedt, Fred.,	Philadelphia,	Pa.	Wm. R. Warner Co.
Schumann, August Frank,	Philadelphia,	Pa.	P. G. A. Weber.
Scott, Charles Abbey,	Oneonta,	N. Y.	E E. Ford.
Scott, James Patrick Edward,	Philadelphia,	Pa.	A. S. Wickham.
Sellers, Oscar Wm.,	Philadelphia,	Pa.	G. W. Fehr.
Semple, John,	Upland,	Pa.	O. P. Hooper.
Sheely, Edward Valentine,	New Oxford,	Pa.	H. C. Blair.
Shelton, Charles F.,	New Lisbon,	O.	J. S. Marsius.
Shimer, Arthur Burton,	Martin's Creek,	Pa.	Louis Oliphant.
Shimer, Miles Herman,	Philadelphia,	Pa.	Rishell & Co.
Shoemaker, Charles Benjamin,	Hummelstown,	Pa.	G. W. Shoemaker & Co.
Shreeve, Alexander,	Wrightstown,	N. J.	Mackall Bros. & Flemer.
Shreeve, Alexander Ross,	Philadelphia,	Pa.	J. L. Nebinger.
Shultz, John Wilson,	Lancaster,	Pa.	S. B. McCleery, M.D.
Simmons, Frank Waters,	Pottsville,	Pa.	Walter A. Smith.
Simonis, Otto,	Philadelphia,	Pa.	W. A. Rumsey.
Simons, Henry Fisher,	Philadelphia,	Pa.	D. C. Lyman.
Slifer, Leo Engleman,	Philadelphia,	Pa.	W. H. Zeigler, M.D.
Smith, Beaton,	Wilmington,	Del.	Beaton Smith.
Smith, Charles H.,	Chester,	Pa.	W. H. Farley.
Smith, James Auburn,	London,	O.	J. R. Atchison.
Smith, John R.,	Harrisburg,	Pa.	F. E. Morgan,
Smith, Joseph Vanest,	Philadelphia,	Pa.	W. H. Gano.
Smith, Robert Victor,	York,	Pa.	Dale Hart & Co.
Spickley, Walter Scott,	Lancaster,	Pa.	W. T. Hoke.
Sprenger, Wm. Alfred,	Lancaster,	Pa.	A. G. Frey.
Stengel, Arthur,	Philadelphia,	Pa.	W. H. Milliken.
Stephens, Halsey DeForest,	Seaville,	N. J.	A. S. Scull
Stephen, Walker Lewis,	Reading,	Pa.	S. H. Archibald.
Stern, Charles Wilson,	Smyrna,	Del.	R. J. Burton.
Stevenson, Fred. Lee,	Princess Ann,	Md.	M. A. Toulson.
Stewart, Samuel Shelton,	Leetonia,	O.	H. H. Ink & Co.
Stout, Charles A.,	Philadelphia,	Pa.	F. Morse.
Stradley, Harry Benninghove,	Wilmington,	Del.	H. M. Trist, M.D.
Sulouff, Samuel Henry,	Patterson,	Pa.	J. N. Rewalt.
Sutton, John Dorrance,	Wilkes-Barre,	Pa.	C. W. Spayd, M.D.
Swartz, Edward F.,	Hughesville,	Pa.	C. M. Swartz.
Sykes, William,	Norristown,	Pa.	J. B Hall.
Taylor, Howard Davis,	Smyrna,	Del.	N. Davis, M.D.
Taylor, Wm. Francis,	Philadelphia,	Pa.	W. Hansell.
Terne, Henry Bruno,	Philadelphia,	Pa.	Bullock & Crenshaw.
Thayer, Houston Talbot,	Chattanooga,	Tenn.	Voigt Bros.
Thomas, David Walter,	Spartanburg,	S. C.	Arthur Irwin.
Thum, John Carl,	Philadelphia,	Pa.	W. F. Steinmetz.
Tomkinson, Horace Lessy,	Harrisburg,	Pa.	B. B. Hamlin.
Truckenmiller, Frank Edward,	Watsontown,	Pa.	C. W. Christ.
Ulmer, Stephen Edward,	Lycoming,	Pa.	F. W. E. Stedem.
Unangst, Harvey Edgar,	Easton,	Pa.	O. F. Zaccherle, M.D.

Name.	*Place.*	*State.*	*Preceptor.*
Van Dyke, John Burt,	Philadelphia,	Pa.	Van Dyke Bros.
Van Horn, Edward Rogers,	Vinton,	Ia.	Walter S. Palmer.
Warfel, Wm. Sylvester,	Shamokin,	Pa.	J. H. Stein.
Wasley, Harry Malcolm,	Shenandoah,	Pa.	A. Wasley.
Weakley, Charles Carpenter,	Media,	Pa.	Geo. Holland, M.D.
Webb, Abner,	Kingsland,	Ark.	
Weber, Howard Elmer,	Mahanoy City,	Pa.	M. R. Stein.
Wegener, August Gerhard,	Hanover,	Germany,	F. G. Wedemeyer.
Weidler, Charles Lincoln,	Portand,	Or.	Bullock & Crenshaw.
Weiser, Spencer Bucher,	Millersburg,	Pa.	F. R. Weiser.
Werner, David Thomas,	Philadelphia,	Pa.	Special Chemistry.
Whitcomb, Wm. Higbee,	Saginaw,	Mich.	Prall & Jones.
Whittem, Wm. Henry.	Chestnut Hill,	Pa.	W. A. Whittem.
Wike, Wm. Jacob,	Marietta,	Pa.	Alb. D. Wike.
Wilcox, Wm. B.,	Blackwood,	N. J.	R. Willard.
Wilson, John Swain,	Burlington,	N. J.	N. D. Streeter.
Winch, Howard George,	Bethlehem,	Pa.	S. Rau & Co.
Wissler, Arthur John,	Lyndhurst,	Va.	Chas. Leedom.
Wood, George Young,	Toronto,	Canada,	R. W. Maris.
Wood, Otis Hunter,	Richmond,	Va.	F. M. Reade.
Wolfe, Wm. Holmes,	Baltimore,	Md.	T. B. Cartmell.
Yaple, Florence,	Chillicothe,	O.	S. Hayhurst, M. D.
Yeakle, Samuel Newton,	Norristown,	Pa.	Wm. Stahler.
Yerkes, Charles Markley,	Philadelphia,	Pa.	J. R. Angney.
Young, Benjamin Franklin,	Coatesville,	Pa.	W. S. Young.
Zeigler, Washington Hayne,	Orangeburg,	S. C.	Drs. Lowman & Lowman.
Ziegler, Howard Philip,	Reading,	Pa.	P. M. Ziegler.
Zimmerman, Herbert James,	Johnstown,	Pa.	G. A. Zimmerman.